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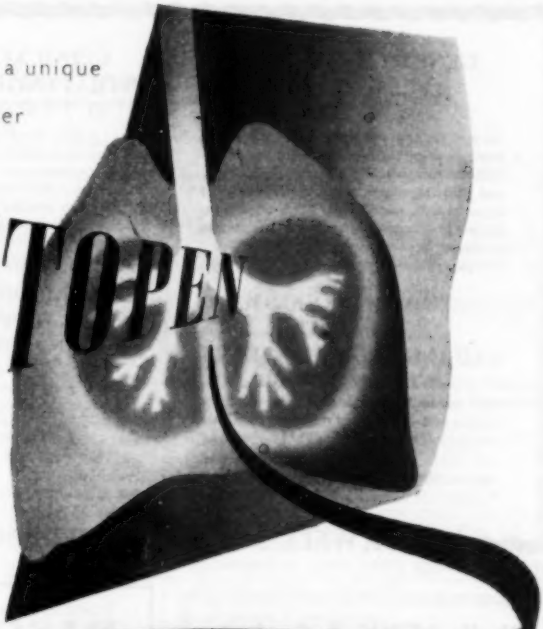

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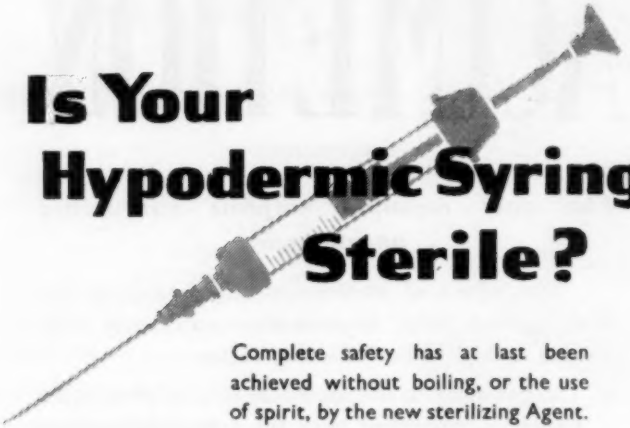

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Each tablet contains amphetamine ('Benzedrine') sulphate 2.5 mg. acetylsalicylic acid 160 mg. : phenacetin 160 mg.

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(Schedule IV)

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Phenacet.	48.00%
Caffein.	2.00%
Codein. Phosph. B.P.	0.99%
Phenolphthal...	1.04%
Excip..	7.75%

Each tablet 8 grains

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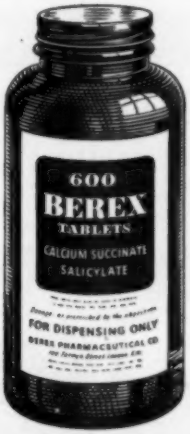

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SAFE SEDATIVES

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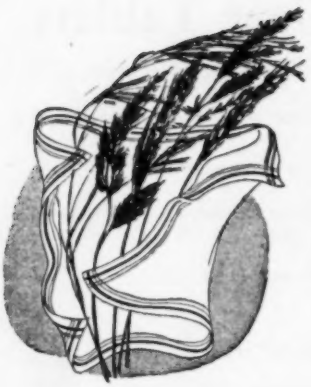
Hay-fever



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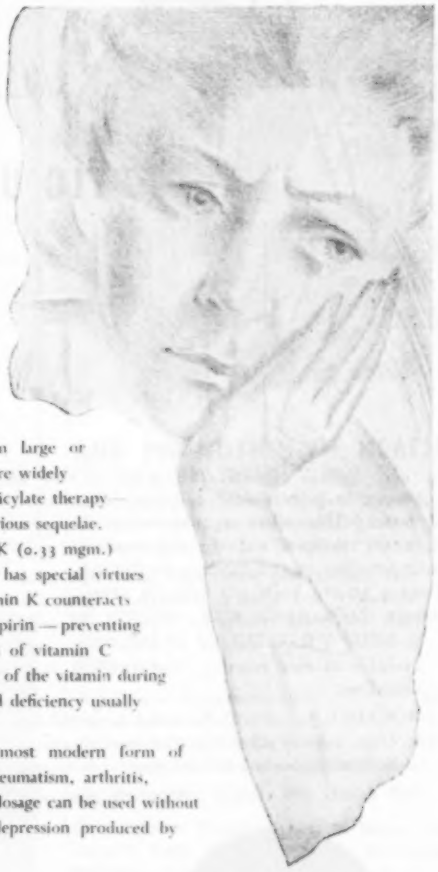

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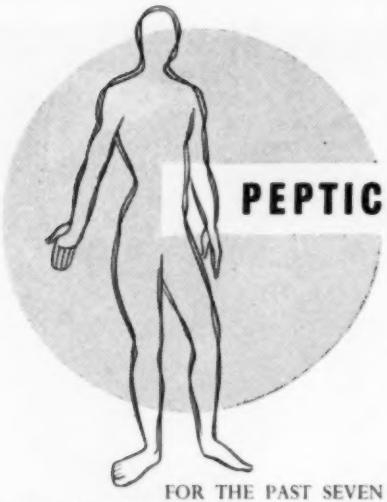

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In a Sterilised glyco-gelatin base.

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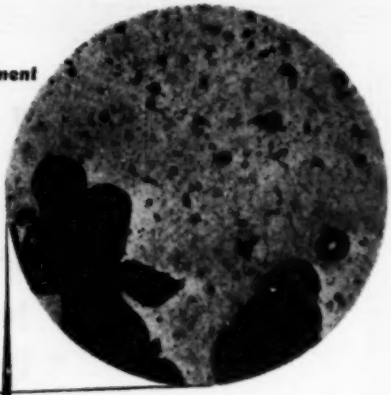

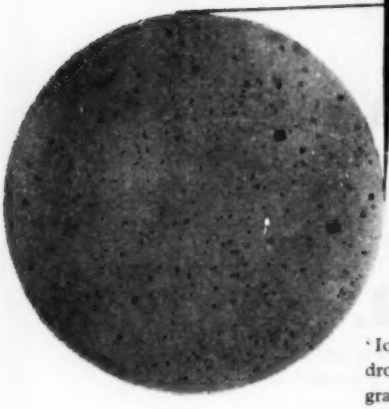

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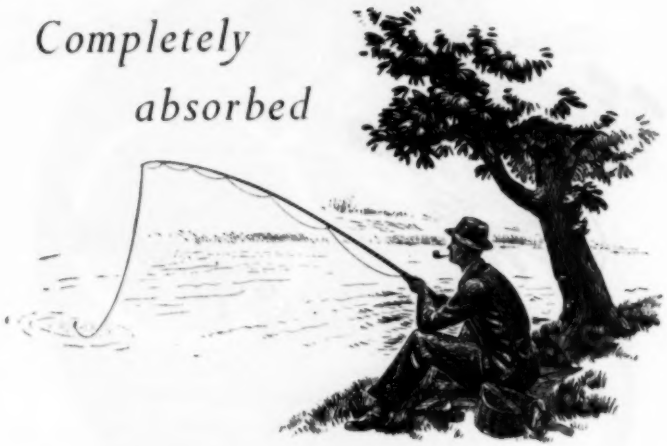

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A & H

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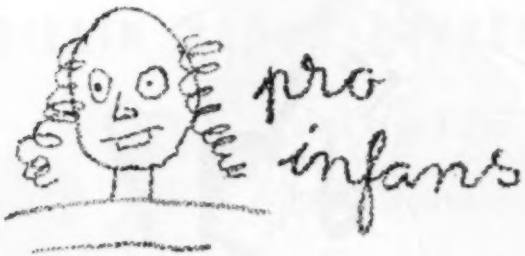

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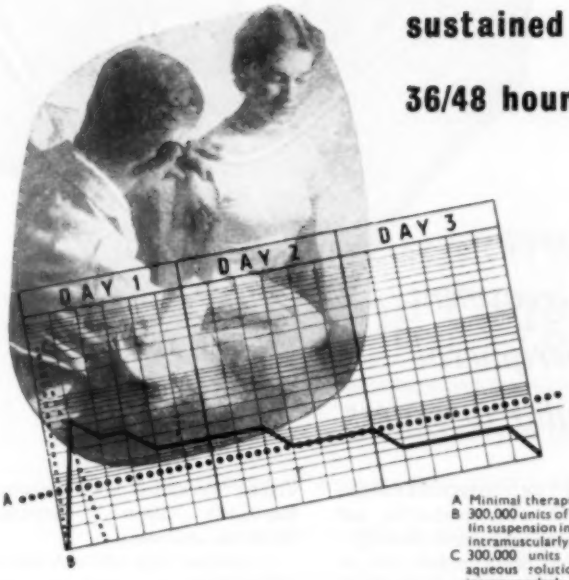

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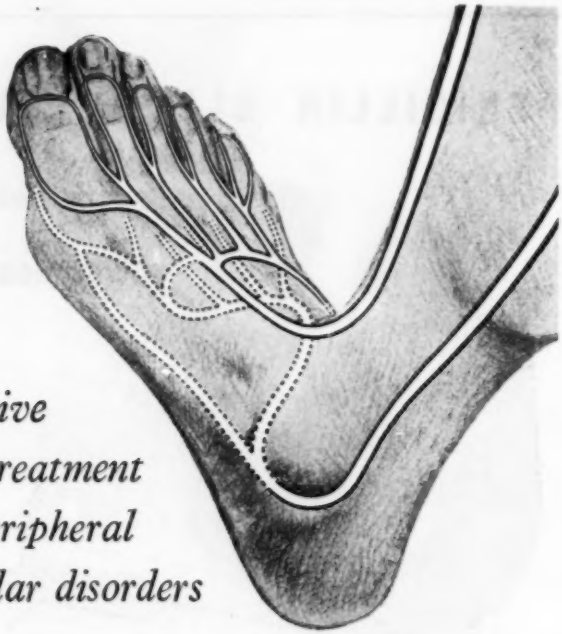

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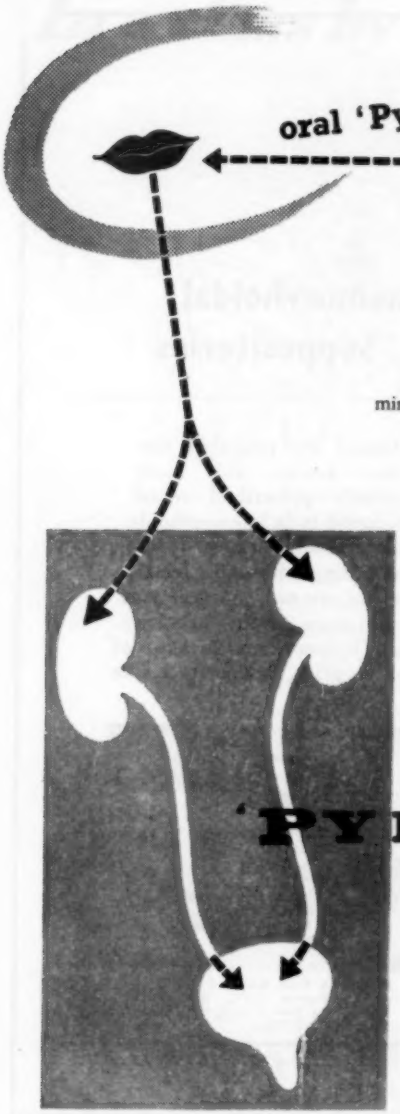

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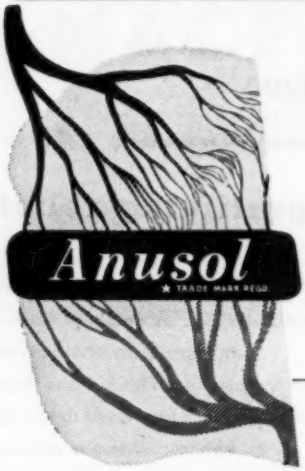

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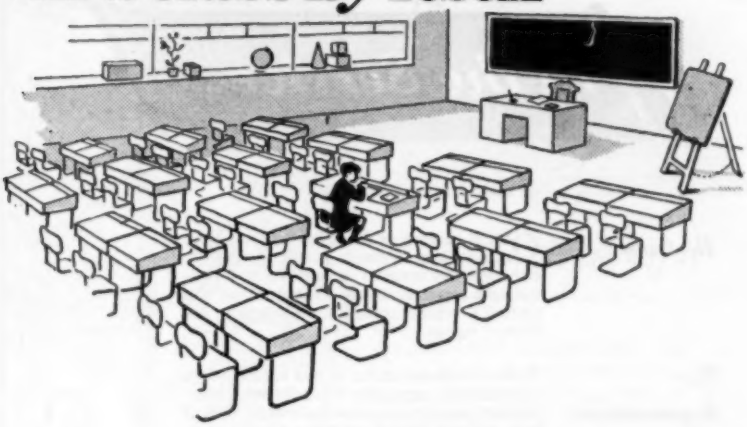

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THE PRACTITIONER

No. 995 MAY 1951 Volume 166

THE MONTH

CONGENITAL abnormalities, the subject of the symposium this month, have always had a peculiar fascination for the medical mind. Whether considered from the genetic, etiological, therapeutic, or sociological angle, the unfortunate victims of these abnormalities have from time immemorial presented a problem which has never failed to excite the interest, not only of doctors, but also of the whole community. In the therapeutic field much has been achieved during the last fifty years in the way of alleviating the lot of the congenitally handicapped. Hare-lip and cleft palate were among the earlier triumphs of the plastic surgeon, to be followed quickly by the successes of the orthopædic surgeon in conditions such as club foot. Today the pace is quickening, and, largely as a result of the advances in anæsthesia and antibiotics, the thoracic surgeons are demonstrating how dramatic and prolonged may be the relief they can bring to the individual with congenital disease of the heart. Etiologically, progress has been slower, but even here advances are being made, notably the demonstration of the relationship between German measles in the mother during the early months of pregnancy and congenital abnormalities in the infant. It is because of these advances in knowledge, which mean so much to the individuals affected, that we have decided to publish this symposium. Although relatively uncommon, congenital abnormalities occur sufficiently often to ensure that every general practitioner encounters examples of them several times during his professional life. They are not patients whom he can treat personally, but it is increasingly important that he should appreciate what can be done for them and ensure that expert advice is sought at the right time.

The Symposium

BIRTHS, marriages and deaths are always news, and the more notable (or notorious) the family in which they occur, the better the news value. Illnesses come into a lower news category and hitherto two factors have decided their precise value—the public importance of the individual, and the seriousness of the illness. Today, a third factor is threatening to come into the picture and to complicate the issue—the nature of the illness. It is at this stage that a problem of medical etiquette arises. To what extent is it a breach of the medical code that the precise nature of an individual's illness should be disclosed to all and sundry? Does the mere fact that a patient is a Prime

Privacy and Publicity

Minister or an Archbishop exempt him from the privacy with which we automatically surround the intimate details of the illnesses of all our patients? If Mrs. Jones, the bank manager's wife, asks us what is wrong with the Mayor, we do not turn round and say that he has a duodenal ulcer which will entail his undergoing dietetic treatment in St. Josephine's hospital for three weeks. We merely admit that he is on the sick list but is doing well. Why, then, if the editor of 'The Daily Thunderer' asks us what is wrong with the Prime Minister, should we be expected to go into all these details? The problem, of course, is by no means a simple one: the public is entitled to have some reliable information as to the illnesses of public figures and their severity, but is it really necessary that, to take two recent examples, they should know that the Prime Minister has a duodenal ulcer or that Mr. Churchill had boils (somewhat pedantically camouflaged by one important newspaper as 'a localized staphylococcal infection'!)? The danger is not only the unnecessary intrusion into the private lives of public figures. There is the real risk that in time, if the habit persists, the mere fact that a specific disease is not mentioned will be taken to mean that the notable involved has some unmentionable disease, of which at the moment there are really only two. The implications of this are so unpleasant, and even serious, that it is to be hoped that the situation will be retrieved immediately, and that newspapers will be satisfied with general bulletins from the sickroom.

'Family Doctor'

WITH that delightful gift for sarcasm which has been the perpetual joy of succeeding generations of medical students during the last fifty years, Sir Robert Hutchison recently suggested that the most appropriate title for a popular health journal was *The Hypochondriac*. That there are undoubted dangers in such publications, no one could deny. The borderline between an active interest in personal health and hypochondriasis is all too liable to be vague and ill-defined, to the detriment of the individual concerned. On the other hand, such journals do exist and apparently have an extensive clientèle. In these circumstances it is foolish to simulate the ostrich and ignore their existence. If the demand for popular instruction in matters of health exists, as it undoubtedly does, then it is the duty of the medical profession to ensure to the best of its ability that the demand is met in as complete and reliable a manner as possible. It is for this reason that we welcome *Family Doctor*, the popular health journal published by the British Medical Association. The first two issues have set a commendably high standard. The B.M.A. has been fortunate in being able to obtain the services, as editor, of one of the most brilliant medical journalists in the country. Dr. Harvey Flack can rest assured that he carries with him the good wishes of every member of the profession as he sets forth on his difficult voyage of steering a safe passage between the Charybdis of inducing hypochondriasis in his readers, and the Scylla of self-medication

Angor Animi

When John Ryle left Guy's Hospital for Cambridge in 1935, clinical medicine lost one of its greatest exponents. He was in the great tradition of Sydenham and his successors, who by a combination of careful observation, sympathetic understanding of patients, and a clear lucid style of exposition raised English medicine to the high level which it still enjoys. It is therefore only appropriate that the current issue of *Guy's Hospital Reports* (1950, **99**, 224) should contain a posthumous article by Ryle describing, from his own personal experience, that 'sense of dying' which occurs in a certain proportion of cases of angina pectoris. He had his first attack of coronary thrombosis in 1942, and between then and his death in 1950 he experienced the symptom on over two hundred occasions. He refers to it as an 'indescribable conviction' that 'I am in fact "passing out" . . . entirely different from the sensations common to ordinary faintness or giddiness'. Its duration is never more than seconds and, although related to substernal pain and exercise, it most often occurs independently of them in time. It is most likely to occur after dropping off to sleep following an unusually heavy day. 'I am then suddenly wrenched back into consciousness by a surging sensation behind the sternum which seems to fill the upper thorax and to spread into the neck and head and sometimes down the arm to the finger-tips. There is no pain at the time and, if there is any local discomfort other than that described, it is of a trivial kind. With this event comes the indescribable conviction, in the more pronounced attacks, that I am in fact "passing out" '. The suggestion is advanced that 'the sense of dying is best considered as a medullary aura . . . that it probably depends upon vasomotor changes operating upon and through the medullary centres'. Two practical points that are emphasized are that a few deep breaths seem to cut short the sense of impending death, and 'as an indication of imminent death it is a false signal, and so in all the conditions in which it occurs, patients may be fully reassured and their distress of mind in some measure relieved'. All who are interested in the art of medicine, as opposed to the science of medicine, should read this short article in its entirety. It is a characteristic postscript to the life of a great clinician.

Morphine in Trains

It is in those countries where there is the least likelihood of drug addiction developing that international and national regulations are most strictly enforced. Certainly, in this country those responsible for the application of the D.D.A. regulations are exemplary in their devotion to the letter of the law. Indeed, there are times when those of us who are more concerned with the use of morphine than its legal restrictions, wonder whether some of this addiction to the law is not misplaced. A notable example of the welfare of patients being sacrificed to legalistic correctitude was the refusal of the authorities to allow morphine to be made freely available for mountain rescue work. It is only within the last year or so that, mainly through the

persistence of certain members of the profession in Manchester, this obvious abuse of authority was removed so that those unfortunates injured in mountaineering or climbing expeditions could receive the expeditious injection of morphine which, if not life-saving, is certainly an incalculable aid to recovery. It is to be hoped that less authoritarian recalcitrance will be shown in augmenting the recommendation of a doctor who was involved in the recent railway disaster near Doncaster. In a letter to *The Times* he points out that in this accident an 'unavoidable time' elapsed before supplies of morphine were available for injection. His recommendation is that 'an emergency supply of morphia in a form ready for injection should be kept in a locked container, under the guard's supervision'. We trust that this reasonable and humanitarian request will meet with an equally reasonable and speedy acceptance. There is everything to be said in its favour and no valid objection to its immediate acceptance.

Rearmament and the N.H.S.

THE need for rearmament is as unfortunate as it is essential. It is a deplorable commentary upon the state of international relationships that so soon after the second war to end wars, the world should be faced with an expenditure upon armaments that is staggering in its immensity. As doctors it is our duty to realize that in the inevitable pruning of government expenditure that is now required, the social services, and therefore the National Health Service, cannot expect to escape unscathed. In a recent review of the problem in *The Financial Times* (March 14, 15), the chairman of the Federation of British Industries' Taxation Committee advocates 'an independent inquiry into the administration and financial control of the National Health Service' as 'the sums involved are so large and the evidence of extravagance so widespread', and he suggests that the amount that could be saved would 'run into some millions of pounds'. Any attempt to prune the new welfare services will be received with an outcry of indignant repudiation by certain sections of the community. Of the necessity, and the possibility, of such pruning, without in any way affecting the health of the nation, there can be little doubt, but it is to be hoped that discrimination will be shown in the necessary cuts. In addition to the modest charge which the Chancellor is proposing to make for certain dental and ophthalmic work, two obvious and expensive anomalies immediately come to mind as requiring investigation. Is there any evidence that the health of the nation is benefiting from the hundreds of millions of prescriptions that are being issued to patients every year? And is there any necessity for the almost equally incredible increase in administrative staff in the hospitals? Why, for instance, does a well-known provincial hospital, which in 1900 had only one member on its administrative staff, now require over 60 in spite of the fact that the bed complement has merely doubled? These are some of the aspects of the N.H.S. that are crying out for searching and independent investigation.

HEREDITY AND ENVIRONMENT IN THE CAUSATION OF FŒTAL MALFORMATION

By L. S. PENROSE, M.D.

Galton Professor of Eugenics, University College, London.

ANATOMICAL malformations present at birth are important causes of stillbirth and neonatal mortality. At the present time, now that improvements in obstetrical technique and infant welfare are still reducing the incidence of infant mortality due to trauma and infection, the hard core of less easily preventable deaths due to internal causes remains. Consequently, within the last fifteen years there has been a greatly increased interest in the search for causes of fœtal malformations, most of which were considered formerly to be unpreventable. These causes can conveniently be classified into three groups: (a) influences acting through the mother and ultimately avoidable by attention to maternal health; (b) purely genetical influences; and (c) interactions between mother and fœtus of both hereditary and environmental origin.

INFLUENCES IN THE MATERNAL ENVIRONMENT

The most characteristic type of fœtal disease derived from the maternal tissues is a transmitted infection. The transmission of variola in this way was first established by Düttel (1702), and Ballantyne (1902) referred to transmission from mother to fœtus of varicella, erysipelas, scarlet fever, measles and typhoid fever. Fœtal anthrax, tuberculosis and malaria have also been recorded. Recently, attention has been drawn to the toxoplasma parasite which can penetrate the placental barrier and infect the infant, causing widespread destruction of the central nervous system, including the retina, with the formation of cysts and scars which become calcified. A remarkable clinical feature of many of these occurrences is that the mother appears sometimes to possess considerable immunity, although she is able to transmit the disease; this is also a feature of congenital syphilis.

Infections.—None of the infections so far listed is credited with producing malformations in the strict sense, and this may be due to the fact that the fœtal disease in the cases recorded has developed at a fairly late stage in development. Infection during the embryonic stage when organs are in process of formation is liable to have very different results. Experiments by Hamburger and Habel (1947) produced microcephaly, associated with general growth impairment, in chicks by injecting forty-eight hour old embryos with influenza-A virus. The mumps virus had rather less effect in the same direction. These observations are in harmony with the striking observations of Gregg (1941) that malformations of various kinds could be attributed

to *maternal rubella*. The rubella syndrome includes congenital cataract, heart disease, deafness, mental retardation, and retinal degeneration (Bardram and Broendstrup, 1947). The severity of the effects varies with the type of epidemic and the stage of fœtal development reached before the disease occurs. Swan and Tostevin (1946) have correlated the degenerative changes in the lens with the time of infection ascertained from the maternal history. It is thus misleading to suppose that maternal rubella inevitably leads to fœtal abnormality. The first two months of pregnancy are by far the most vulnerable period in this respect. The total number of children affected in this way is fortunately not large. Grönvall and Selander (1948) found 26 cases of maternal rubella but only one malformed infant attributable to this cause in 24,549 confinements. The effects of mumps—5 malformed infants from 34 maternal cases in the same series—may possibly have to be taken into serious consideration. The analysis made by Landtman (1948) suggested that miscellaneous maternal infections, including influenza, could also damage the fœtus.

Toxic factors.—According to Gruenwald (1947) the pathological changes in the fœtus caused by maternal rubella are due to toxic effects rather than to direct infection. Indeed there is experimental evidence that malformations can be caused by toxic factors. Thus, Gillman and others (1948) reported that malformed offspring could consistently be produced by saturating pregnant female rats with trypan blue by injection before and during the early stages of pregnancy. Injections were given at regular fourteen-day intervals, and it was found that when the injection fell on the eighth day of pregnancy or thereabouts more than half the offspring were malformed. Nevertheless, the dye itself did not enter the fœtus. These results form part of a large quantity of experimental data which has accumulated tending to show that chemical and physical factors acting on the mother at early stages of pregnancy can induce malformations.

Malnutrition.—Warkany and Schraffenberger (1944) subjected pregnant animals to vitamin starvation, and more recently Ingalls (1950) has used anoxia. The important results of these experiments cannot without considerable reservation be transferred to the human situation because the degree of maltreatment of the animals has been far greater than is likely to occur in ordinary human environments. The degrees of malnutrition commonly found among pregnant mothers are probably insufficient to have any serious effects upon the fœtus. Thus, neither Murphy (1947) nor later investigators have been able to show statistically that diet has any effect in the production of fœtal malformation.

X-ray irradiation.—The question of quantity arises also in relation to the possibility of fœtal damage due to X-rays. Kaven (1938) irradiated pregnant female mice in the early critical stages of gestation and found that *anencephaly* and many other kinds of malformations were produced in the offspring; heavy doses were required to produce the result. The comparable clinical

observations made by numerous people and summarized by Murphy (1947) indicate the likelihood that therapeutic doses of pelvic irradiation given to pregnant women can seriously damage the embryo, and *microcephaly* can result. The amount of exposure to radiation in routine X-ray examinations is unlikely to have any such effect. This direct injury to the fœtus through therapeutic irradiation must be distinguished absolutely from the hazards of exposure of the parental gonads to irradiation in provoking new mutations which become visible only in subsequent generations.

Psychological factors.—In earlier times physicians laid stress on the psychological condition of the mother during pregnancy as a factor in causation of fœtal defects. Thus Sedgwick (1861) noted that a woman frightened by a ferret during pregnancy gave birth to a child with eyes precisely like that animal, and all her subsequent children were similarly disabled. Recently, Ingalls (1947) and Benda (1947) have revived the idea of maternal impressions in a modified form, supposing that psychological trauma may affect the fœtus by way of endocrine disturbances. So far the evidence for these ideas is slight.

GENETICAL CAUSES

Evidence for genetical causation of fœtal malformations is derived from two sources: first, experimental mammalian genetics, and secondly, observations on incidence in human families.

Experimental evidence.—Experimental work on mice has shown clearly that recessive genes are responsible for more than one type of *hydrocephaly* (Grüneberg, 1947). *Achondroplasia* in cattle and in fowls is also a recessive trait. *Spina bifida* due to a single gene, again recessive, has been found by Hammond and Walton (1934) in rabbits. The ultimate origins of these defects are considered to be 'point' gene-mutations which have occurred in the past history of the germ plasm of the animals concerned. On the other hand, the causation of certain types of *anencephaly* in mice is entirely different from this. Snell and others (1934) were able to demonstrate that a considerable number of malformations of the skull and nervous system in mice were due to disturbed chromosome mechanisms, known as translocations. These were induced by exposing males to X-rays and breeding from them. Carriers of abnormal chromosome configurations could develop entirely normally; some of their offspring would also be normal carriers and others would be grossly malformed and anencephalic because they possessed unbalanced chromosomes. Yet another type of genetical effect has been demonstrated by Wright (1934) in a condition known as *otocephaly* in guinea-pigs. The condition ranges from a mandibular defect to *cyclopia* and even to *acephaly*. It occurs in a proportion of members of certain stocks but, within these stocks, it does not appear to have any special genetical determination and, so far as is known, within a given susceptible stock, the development or absence of the condition must be ascribed purely to chance.

Familial incidence.—The genetics of malformations in human embryos has been studied by examining pedigrees. Familial concentration within sibships or among cousins can be taken as evidence for genetical causation. Moreover, the search for parental consanguinity, the hallmark of the action of rare recessive genes in human populations, is sometimes successful. The ascertainment of a familial incidence greater than that in the general population does not prove hereditary causation, but it is very useful for prognostic

purposes. Pooling the three most common types of severe malformation—anencephaly, hydrocephaly and spina bifida—which together affect nearly one infant in 200, an estimate of the chances of repetition of one or other of these traits in the sibship can be made. As shown in table 1, the chance of recurrence is nearly 4 per cent. or 1/25; the likelihood of a subsequent child having some other type of defect is not negligible.

When the genetical causes of human malformations are studied in detail, it is found that they have great variety. Some conditions are thought usually

TABLE 1

SIBS BORN AFTER FIRST CASE OF ANENCEPHALY, SPINA BIFIDA OR HYDROCEPHALY: DATA FROM 144 SIBSHIPS

Condition of Sibs	Number	Per cent.
Normal	147	77·4
Anencephaly, spina bifida or hydrocephaly	7	3·7
Other serious defect (e.g. gross mental defect, congenital heart, hare-lip)	9	4·7
Miscarriage or stillbirth	27	14·2
Total	190	100·0

to arise on account of recent mutations in parental germ cells. Examples of this are *achondroplasia* and *tuberose sclerosis*. More common malformations like *anencephaly* and *mongolism* also usually occur sporadically, but to assume that fresh mutations were often the cause would imply an unreasonably high mutation rate in man as compared with other animals. With regard to *anencephaly* itself, there is a divergence of views. Schade (1939) and Polman (1950), on the basis of pedigree studies, find evidence of recessive determination of many, if not all, cases. To agree with the low familial incidence generally observed it has to be assumed that the majority of affected brothers and sisters miscarry and are consequently unrecognized. Böök and Rayner (1950), however, consider that there is no reliable evidence for the over-all assumption of the recessive hypothesis. The possibility that chromosome irregularities play an important part (Haldane, 1938) has not yet been seriously investigated.

Sex ratio.—An odd feature of *anencephaly* is its sex ratio (about 85 per cent. of cases are females) which suggests an abnormality in the sex chromosomes. Congenital *hydrocephaly* has many forms, and one type, which is confined to males, may reasonably be attributed to a sex-linked gene (Bickers and Adams, 1949). *Spina bifida* gives rise to more awkward problems for genetical study because there are so many degrees, and the occult type grades into normal variation. There are, however, indications that some severe cases are due to recessive autosomal genes.

One other possible genetic cause of fœtal malformation may be mentioned, namely, a recessive factor affecting the maternal constitution in such a way that embryos are adversely affected. Hammond and Walton (1934) observed

such a situation in rabbits. In cattle, as well as in man, the tendency to produce fraternal twins is due to a maternal recessive diathesis (Bonnevie and Sverdrup, 1926), but no definite malformations have been proved to be caused in this way.

INTERACTIONS BETWEEN MOTHER AND FŒTUS

Most definite of the known pathological reactions between mother and fœtus is that due to *antigenic incompatibility*. The formation of antibody in the maternal serum to a fœtal antigen, inherited from its father and not possessed by the mother, gives rise to destruction of fœtal erythrocytes. No developmental anomalies are as yet known to follow from such situations, although Wiener (1946) suspects that spina bifida may sometimes originate in this way.

The effects of *maternal age and parity* can be studied statistically in relation to malformations and there is clear evidence of their etiological importance in specific diseases. Outstanding is the case of *mongolism*. Up to the maternal age of thirty-four years the chance in the general population of the birth of a mongol child is less than one per thousand; between the ages of thirty-five and forty-four years, the chance is nearly one in 200, and after forty-five years it rises to one in 40. The evidence of hereditary influence is scanty and difficult to interpret. Familial cases are not infrequently seen but, with a condition as common as this, the occurrence of two cases in the same family group due to chance sampling would not be unexpected. Recently, the literature has provided two striking records of undoubted cases of mongolian female imbeciles having children of their own. In one case the child was normal and healthy (Sawyer, 1949), and in the other case it was itself a mongolian imbecile (Lelong *et al.*, 1949). It seems likely that the causation of mongolism is a complex interaction between the mother and a fœtus of specific genetical constitution; this specific constitution must be common, but only occasionally, in consequence of some factor dependent upon maternal age, e.g. endocrine disturbance or immunization against the fœtus, does mongolism actually result from it.

The genetical background of *achondroplasia* has certain superficial similarities to that of mongolism. It is, however, much rarer than mongolism. Most cases are without similarly affected relatives, and Mörch (1942) believes that most of these are the results of new mutations. Occasionally achondroplasia is transmitted for more than one generation and so it seems to be due to a single dominant gene. There are a number of less serious skeletal defects, like *brachydactyly* and *ectrodactyly*, which also appear to be caused by dominant genes. They often occur sporadically and can then be attributed to fresh mutation. Maternal effects, however, are not so clearly noticeable in these minor conditions in man as in some experimental animals. *Polydactyly* in guinea-pigs, for example, was found by Wright (1926) to be influenced by maternal age. Also Holt (1947) showed that

polydactyly in mice, although determined by a single recessive gene, was manifested more often in the offspring of young mothers than older ones.

The effect of the mother on a genetical character of quite another kind is also seen in man in the tendency for fraternal twins to be born at relatively late maternal ages, a peculiarity first noticed by Duncan (1866). Other conditions, in which advancing maternal age is a factor of importance, are congenital *hydrocephaly*, *hydatidiform mole* and central *placenta prævia:* these are strictly fœtal malformations, but their only other point in common is the general obscurity of their genetical origins.

Order of birth, by itself, is a factor of noticeable importance in certain diseases (Penrose, 1939), notably, *anencephaly*, *hypospadias* and congenital *pyloric stenosis*. All these conditions probably have their specific genetical backgrounds, but the hereditary tendencies seem to be manifested especially in first-born children. Recently, McKeown and Record (1951) have collected evidence for thinking that season of birth is also of significance in the etiology of anencephaly, which has a maximal incidence in infants born in December and lowest in those born in June.

Earlier writers, especially interested in the problems of causation of malformations, laid much stress on conceptions of abnormal *intra-uterine pressure* and amputation by amniotic bands. Whilst malposition of the fœtus can undoubtedly affect the development of its limbs, as in certain types of *club foot*, the study of these reactions is incomplete unless the cause of the malposition or abnormal amnion is investigated. So far the fundamental causes producing these interactions have not been identified. Morphologically, however, distinctions can be made between malformations due to these intra-uterine accidents and those with more specific genetical causation, as shown by Birch-Jensen (1949) in his study of *congenital amputations of hands and feet*. The abrupt cessation of a normal limb is quite easily distinguishable in many cases from a limb altogether abnormally developed. Also, in the case of club foot, there are probably many alternative causes. In a comprehensive survey, Böök (1948) found that 3 per cent. of the sibs of index cases were similarly affected, that there were no simple genetical rules about transmission, and that heredity and environment could produce quite similar abnormalities.

CONCLUSION

As will be gathered from the foregoing discussion, the causation of fœtal malformation presents a bewildering multiplicity. Whilst the genetics of some rare deformities are clear, the most common conditions are difficult to attribute to unique causes. Many types of adverse circumstances, genetical or environmental acting either separately or in collaboration, are implicated. At the critical stages of embryonic development during the first two to three months, similar pathological reactions leading to malformation may be induced by quite diverse causes. The present state of knowledge is very in-

complete but advances are now rapidly being made. The fact that the causes of fœtal malformations are multiple and that so many environmental causative influences are being detected, is leading to a much more promising view of the possibilities of prevention than was entertained some years ago, when almost all congenital defects were believed to be due to inexorable heredity.

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CONGENITAL HEART DISEASE

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THE incidence of congenital cardiac abnormalities is about 1.5 to 2 per cent. of all cases of organic heart disease. The incidence very naturally varies with different age-groups, being more common in young children and infinitely less common in the adult groups. Below the age of five the vast majority of cases of heart disease are congenital in origin, as rheumatism is rarely found below this age. This emphasizes the need for a careful and detailed history in order to establish whether a cardiac lesion was present in infancy or early childhood. At one time congenital lesions were the Cinderellas of cardiology and mainly of academic interest only. Now that surgical cure or amelioration is possible it is obvious that an accurate diagnosis is of fundamental importance.

GENERAL CLINICAL PICTURE

As already mentioned, a careful history is essential, with special reference to symptoms and the order of their appearance. As a general rule, most congenital heart lesions are embryologically related to the fifth to the eighth week of intra-uterine life. The general state of the mother's health in the early weeks of gestation should be explored with, of course, special reference to rubella, now known to be an etiological factor of importance in the genesis of these defects, if the attack occurs in the first two months of pregnancy. A child may have been born 'blue' and remain permanently so. There may have been episodes of cyanosis in relation to feeding or respiratory infections. Search should be made for associated congenital abnormalities of other tissues or structures, for their presence lends weight in diagnosis. They are likely to be found in 20 per cent. of cases. There is a high incidence of congenital cardiac defects in mongolism, or with arachnodactyly.

In many cases there are no symptoms whatsoever but physical signs are marked. *Dyspnœa* is of importance and may be of all grades of severity. The slighter forms may be accepted by the patient as habitual and natural. The more severe forms are obvious, and in cases accompanied by marked cyanosis, whatever the structural heart lesion, the subject often squats on the heels when breathless and finds that this particular position affords him maximum relief. It has been shown that arterial oxygen saturation is increased in this position. Other symptoms are rare. Palpitation is occasionally complained of in a patient with a patent ductus arteriosus. Syncopal attacks may occur in aortic stenosis. Convulsive seizures may be troublesome in the severely cyanotic case.

Cyanosis may be a major indication of severe congenital heart disease, and is due to an excess of reduced hæmoglobin in the capillary blood. Central cyanosis due to arterial anoxæmia is brought about either by a venous

arterial shunt or a diminished pulmonary blood flow with imperfect oxygenation of blood in the lungs. It is aggravated by exercise which increases oxygen consumption. The characteristic coloration is best seen in the conjunctivæ, mouth or other warm mucous surfaces. Polycythæmia is often present and emphasizes cyanosis. Peripheral cyanosis may be noted at the extremities, nose, ears or exposed surfaces where venous stasis allows more complete utilization of oxygen by the tissues. The inner surface of the lips and conjunctivæ are unaffected. Clubbing of the fingers accompanies central cyanosis and is proportional to its severity. The distinction between central and peripheral cyanosis may be very difficult on clinical grounds and only solved by the estimation of oxygen saturation of arterial blood.

The pulse is usually regular except in some cases of atrial septal defect, or cases complicated by hypertension, when auricular fibrillation may be present. Tachycardia and ectopic rhythms occur with anomalies of the pulmonary veins and the Ebstein anomaly. A Corrigan pulse occurs in patent ductus, aortic septal defect, and in those cases in which true aortic incompetence may be a complication, as in coarctation. It is wise to observe pulsation in the neck and episternal notch as part of the routine examination. The femoral pulse should always be felt; it is greatly reduced, delayed, or absent in coarctation. A small pulse is present in aortic stenosis and in most severe congenital cyanotic or acyanotic anomalies, other than those mentioned above. The blood pressure tends to be normal or low. Hypertension is present in the upper extremities in coarctation of the aorta. A low diastolic pressure is found in patent ductus or aortic septal defect and it falls to a lower level with exertion.

The character of the *apex impulse* may have an important bearing on diagnosis. A normal apex beat is gentle and associated with slight systolic retraction of the chest wall at the apex. A left ventricular apex beat may be either tumultuous or hyperdynamic as in patent ductus or ventricular septal defect, or heaving if there is marked left ventricular hypertrophy. If the right ventricle is enlarged the impulse has a tapping quality, but with considerable enlargement there is a powerful thrust and lifting in the third and fourth left spaces. Systolic pulsation in the second and third left spaces, and often a diastolic shock, accompany pulmonary artery dilatation.

AUSCULTATORY FINDINGS

There is much that might be said about auscultation of these cases, for it is the accurate assessment of the site of maximum intensity of a murmur and thrill which counts for so much in diagnosis. A harsh systolic murmur is the common finding and generally it is best heard at a site which does not closely correspond to the sites commonly associated with rheumatic valvular disease. Thus, in the ventricular septal defect the systolic murmur and thrill are characteristically maximum in the fourth left space. In aortic and subaortic stenosis both systolic thrill and murmur are situated over the upper sternum and in the second right interspace; the murmur is conducted along the

vessels of the arch of the aorta. The systolic murmur of coarctation may not be marked over the heart itself but is loud over the vessels of the collateral circulation. Thus it may be well heard in the scapular region and along the vertebral column. In pulmonary stenosis the systolic murmur, conducted to the left clavicle, is best heard in the second left space. A coarse thrill is commonly associated. The Gibson, or machinery, murmur of a patent ductus is loudest and most characteristic in the second left space, generally close to the sternum. The systolic murmur of all types of congenital heart disease may often be heard in the back.

A diastolic murmur may be present from organic aortic incompetence due either to rheumatism or to bacterial endocarditis. It is now more generally realized that functional diastolic murmurs are not uncommon. Thus the Graham Steell murmur of pulmonary incompetence may be heard in those anomalies in which the pulmonary artery is dilated, notably the atrial septal defect. A diastolic murmur is often audible when there is an excessive pulmonary blood flow due to an arteriovenous shunt, as in the patent ductus of magnitude, or the large ventricular septal defect, and results from an excessive mitral blood flow. It is identical with the diastolic murmur of rheumatic mitral valvulitis. Lastly, the pulmonary second sound must always be carefully considered. Usually the second sound is split into an aortic and pulmonary component representing closure of the respective valves, the aortic component being first and normally loudest. A split second sound in the pulmonary area affords evidence of the existence and permeability of both vessels (Taussig, 1947). In the tetralogy, and in severe isolated pulmonary stenosis, the second sound is single. On the other hand, in cases with pulmonary hypertension the pulmonary second sound is markedly accentuated. In the atrial septal defect the second sound is widely split with but little accentuation of the pulmonary component.

SPECIAL METHODS OF EXAMINATION

Cardiac catheterization may be necessary when the diagnosis is in doubt. This investigation calls for much time-consuming labour on the part of the investigator and technician and also for about two hours of the X-ray department's time. The information gained is mainly physiological, but screen observation of the catheter tip may furnish anatomical data of value. Blood samples are taken under oil from the different cavities and vessels reached by the catheter, and pressure measurements are also recorded by appropriate apparatus. Normally the catheter enters the right heart and pulmonary artery. It may pass through a foramen ovale into the left auricle. It may enter a transposed or dextroposed aorta.

The oxygen content of samples may indicate abnormal shunts and their volume and importance can be estimated. The oxygen consumption can be measured and the cardiac output calculated. Other methods enable calculation of the pulmonary blood flow, a point of great importance if surgical treatment of the cyanotic case is contemplated, and data so obtained may

determine the necessity for operation. An interatrial shunt is demonstrated by a significant difference in the oxygen contents of blood obtained from the superior vena cava and right auricle. In patent ductus the oxygen content of blood from the pulmonary artery exceeds that from the right ventricle.

Blood taken by puncture of the femoral artery is 95 per cent. saturated with oxygen in the normal subject. An abnormal degree of oxygen unsaturation in arterial blood is suggestive of either a venous arterial shunt or pulmonary disease. The classical venous arterial shunt occurs in the tetralogy when the aorta is dextroposed. Exercise increases the volume of this shunt because the narrowed pulmonary tract is unable to accommodate an increased cardiac output and therefore cyanosis becomes more marked. In the tetralogy, operation is desirable only if the arterial oxygen saturation is less than 75 per cent. at rest. Measurements of pressures within the right ventricle and pulmonary artery afford information of the greatest value. Normally, mean pressure in the pulmonary artery is about the same as in the right ventricle. In pulmonary stenosis, pulmonary artery pressure is reduced in proportion to the degree of stenosis, and in the tetralogy mean pressures are usually below 8 mm., in contrast to the average 20 mm. In valvular stenosis the change from right ventricle pressure to low pulmonary artery pressure is abrupt; in subvalvular stenosis the change may be less abrupt.

Catheterization has furnished much information about the patent ductus arteriosus and the ventricular septal defect. It has shown that the pulmonary blood flow may be two or four times the systemic blood flow in the ductus, and at least double the systemic flow when there is a ventricular septal defect of magnitude. Light has been shed on pulmonary hypertension secondary to these defects and their relation to the pulmonary resistance. The recent work of Wood (1950) should be consulted in regard to these points.

Radiology.—The X-ray examination is of the utmost importance, and certain anomalies have a characteristic appearance. A notable advance has been the recognition of conditions of pulmonary plethora (increased pulmonary blood flow) and pulmonary ischæmia due to pulmonary stenosis or atresia. *Pulmonary plethora* may be recognized by the large pulmonary vessel shadows, often with marked pulsation reaching its maximum in the atrial septal defect, but which may be considerable in the patent ductus and ventricular septal defect. Pulmonary artery engorgement is also present in transposition of the vessels. In conditions of *pulmonary ischæmia*, notably the tetralogy of Fallot, the lung fields are clear and the pulmonary vascular shadows slight. In the simple *pulmonary stenosis* the pulmonary trunk is dilated (post-stenotic dilatation) and the branches may be small or normal in size. In the outer third of the lung fields vascular markings may be absent. In cases of *pulmonary atresia*, or persistent truncus arteriosus, in which a pulmonary circulation is derived almost wholly from a collateral circulation through bronchial arteries, there are small nodular hilar shadows and linear vascular markings in the very translucent lung fields. In these cyanotic conditions with pulmonary ischæmia there is a concavity at the site of the

pulmonary arc. The apex of the heart may be upturned to give a *cœur en sabot* silhouette. In the Eisenmenger complex, which probably includes many cases of large ventricular septal defects with pulmonary hypertension, the pulmonary vessels are dilated and prominent. The *atrial septal defect* is characterized by gross cardiac enlargement, mainly of the right ventricle, and massive pulmonary artery dilatation and pulsation. Many cases of important *ventricular septal defect* show pulmonary plethora and arterial dilatation. There is no absolutely characteristic picture of a *patent ductus arteriosus* and screen examination or skiagram may closely resemble that of a ventricular septal defect. The pulmonary arteries are often dilated and may pulsate vigorously. *Coarctation of the aorta* presents the pathognomonic sign of notching of the under-surfaces of the ribs. The aortic knuckle is small. *Dextrocardia* is shown by a mirror-image picture of the heart with associated transposition of the viscera, or rarely as an isolated phenomenon. A right aortic arch is present in 25 per cent. of cases of tetralogy of Fallot, and may exist as a symptomless, sole abnormality, or occasionally give rise to dysphagia.

Angiocardiography.—The cardiac chambers can be visualized successively by the intravenous injection of 'diodrast'. This examination is not wholly devoid of discomfort and even danger, and demands special equipment and impeccable technique. A series of pictures are obtained at half-second intervals, and by this means it is possible to demonstrate the site of coarctation. The presence of shunts may also be proved. Its most important application has been in regard to cyanotic cases, and lesions of the pulmonary tract. In the tetralogy of Fallot a dextroposed aorta causes immediate filling of both great vessels. It is possible to determine in a great many cases whether or not conus or valvular pulmonary stenosis is present. Both subclavian arteries are visualized—a point of importance to the surgeon. Cases of transposition, persistent truncus arteriosus, and tricuspid atresia may all be recognized by this method.

Electrocardiography.—A normal conventional electrocardiogram may be present despite gross anatomical deformity. The only pathognomonic picture is that of dextrocardia, in which the complexes of lead 1 are inverted and leads 2 and 3 interchanged. Unipolar leads have shed much light on congenital heart disease and have become an essential part of investigation. The unipolar limb leads provide information as to the electrical position of the heart and its rotation. The chest leads, taken successively over the right and left ventricles, furnish indications as to the hypertrophy or dominance of one or other of the ventricles. Recent researches have shown characteristic (but not necessarily diagnostic) patterns in different groups of anomalies.

Right ventricular hypertrophy of varying degree with a vertical heart is found in most cyanotic cases, but in tricuspid atresia, associated with aplasia of the right ventricle, there is left ventricular hypertrophy. A sharp pointed P wave occurs in pulmonary stenosis. Left ventricular hypertrophy with a horizontal heart may be found in aortic tract lesions. Sometimes there may be evidence of hypertrophy of both ventricles.

SURGICAL TREATMENT

Certain anomalies are capable of surgical amelioration or cure. In general it may be stated that these operations are best tolerated in childhood rather than in the later age-groups. Correct diagnosis is an essential prerequisite to operation.

Surgical treatment of the *patent ductus arteriosus*, which has been practised since 1939, is extremely satisfactory. The most suitable age for operation is between five and ten years, but in the infected case, or the case with a large heart and incipient failure, operation should be carried out irrespective of age. Infection is an indication for urgency, and operation should be preceded and accompanied by appropriate penicillin dosage. The ductus is generally ligatured, but Gross (1947) prefers excision between ligatures. The latter technique obviates the risks of recanalization of the ductus, a circumstance which is rare in British experience. The operative risk is between 2 to 3 per cent., and about 10 per cent. in the infected case. In regard to the case with incipient failure, operation should not be delayed, because the situation may become irreversible. Opinions may differ as to whether or not all cases should be submitted to surgery, but if the average age at death by infection or failure is thirty-four years, as is stated, there appears to be ample justification for advising operation.

Coarctation of the aorta may be treated by excision of the stricture and end-to-end anastomosis of the divided aorta. The collected statistics from different centres of 128 operated cases reveal a mortality of 16 per cent. (Shapiro, 1949). In the hands of individual surgeons this rate may be as low as 10 per cent. The third and fourth decades are the danger periods for cases of coarctation, and if the patient reaches the age of thirty his risks appear to diminish and survival may be well into middle life, or later, with little or no disability. It is very difficult to assess the need for operation in these cases, which are mainly symptomless, and are only found by accident in childhood. Severe hypertension in childhood is an indication for surgical interference. The best time for operation is, of course, in childhood, when the aorta is readily mobile and devoid of degenerative changes.

A *double aortic arch*, if detected in childhood as a cause of dysphagia, recurrent tracheitis and bronchial infection can be successfully treated by ligature of a portion of the anterior arch (Gross, 1945).

In regard to *the cyanotic case*, the avowed aim of treatment is to relieve central cyanosis by increasing the pulmonary blood flow. The operation is thus palliative, and not a cure of the anatomical abnormality as in the treatment of a patent ductus or coarctation. There is a choice of operative procedures. The Blalock-Taussig (1945) operation consists of anastomosis of one or other subclavian artery to the homolateral pulmonary artery. An artificial ductus is thereby achieved, and it is subject presumably to the same risks as any other patent ductus. The results, however, are admirable. The Potts (1946) operation consists of side-to-side anastomosis between the aortic arch and left pulmonary artery, the size of the opening being at the

discretion of the operator. This procedure produces the same physiological result as the Blalock operation. The Barrett and Daley (1949) operation, which is applicable to selected cases, aims at producing pleural adhesions and so encouraging a collateral circulation to the lungs. In certain cases this has proved highly successful. It might be added, however, that any trauma to the mediastinum, or even a failed Blalock operation, may achieve good results simply from the development of new vascular channels subsequent to the surgical intervention. Lastly, pulmonary valvulotomy as developed by Brock (1948) has a rapidly advancing field of usefulness in those cases in which the pulmonary artery is permeable, and in cases of conus stenosis when tissue is actually removed to overcome the obstruction.

There can be no doubt about the desirability of surgical operation in appropriate cyanotic cases, that is, in cases which on investigation are shown to have as a basic lesion an insufficient blood supply to the lungs. The tetralogy of Fallot, severe cases of pulmonary stenosis with reversed interatrial or interventricular shunts, tricuspid atresia, cases of persistent truncus arteriosus with bronchial artery circulation, and single ventricle with diminutive chamber, the pulmonary artery arising from the dimunitive chamber, are anomalies for which surgery may be desirable.

The general indications for operation are that the diagnosis should be accurate and, if possible, proved by angiocardiography and cardiac catheterization. The arterial oxygen saturation should be less than 75 per cent. at rest, and the pulmonary artery pressure less than 10 cm. saline. There must be evidence of the existence of both pulmonary and subclavian arteries.

Operation should be attempted whenever possible between the ages of five and twelve. In the successful case, cyanosis largely disappears together with clubbing, polycythæmia rapidly diminishes, oxygen saturation of the arterial blood increases to the neighbourhood of 80 per cent., and the capacity for exertion is markedly improved. The successful nature of the anastomosis is indicated by the presence of a loud continuous murmur of the artificially created ductus.

The over-all mortality of Blalock's cases of all types is 17 per cent., but in selected cases of the tetralogy of Fallot, 10 per cent. In some series the mortality rate is as low as 6 per cent. In valvulotomy the mortality rate is somewhat higher, but is being rapidly reduced by continued experience.

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CONGENITAL ABNORMALITIES OF THE GASTRO-INTESTINAL TRACT

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The embryological and evolutional development of the gastro-intestinal tract is so complicated and the final result so specialized that the occurrence of congenital abnormalities is not surprising. Sometimes the developmental failure is too gross for surgical correction, but fortunately there are several deviations from the normal which can be diagnosed and treated successfully. Some abnormalities are evident at birth: others show no sign until later in infancy or childhood. In infancy, diagnosis must always be difficult because the abdomen is rather a closed mystery. Physical signs are difficult to interpret and an exact diagnosis is not always possible. It is, however, generally feasible to arrive at a general conclusion on broad pathological lines, and it is always imperative to give the patient a chance of surgical relief even though the outlook may appear forlorn.

In the last twenty years, through the development of pædiatric surgery, many conditions which were formerly thought to be hopeless have been brought under surgical control. The subject is large for one article, and thus many of the rarer abnormalities must be omitted, also some diseases, such as hypertrophic stenosis of the pylorus and Hirschsprung's disease, in which the congenital relationship is present but somewhat more remote.

FAULTS IN ROTATION OF THE MID-GUT LOOP

It may be as well to consider first those congenital abnormalities which affect the whole of the intestinal tract, failures in the complicated evolutions whereby a simple tube lying in the medial sagittal plane becomes by the 11th week of fœtal life a gastro-intestinal tract of specialized segments occupying the abdomen in an orderly and regular anatomical arrangement.

Embryology.—To understand the departures from the normal, a brief recapitulation of the embryological development is helpful, for without some knowledge of the normal, the abnormalities cannot be understood or treated rationally.

The primitive gut consists of three portions, the foregut, midgut and hindgut, each with a ventral and dorsal mesentery, each with its own arterial supply. The foregut and hindgut attain their final position in a relatively simple manner; the midgut passes through some complicated movements. The midgut grows at a great pace, and with insufficient room in the cœlom extends into the umbilical cord. About the tenth week the midgut loop retreats into the abdomen, and as it does so an anti-clockwise rotation occurs. The artery of the loop—the superior mesenteric—runs from the aorta to the

apex and divides the loop into two parts—pre-arterial and post-arterial. The pre-arterial extends from the duodenum to the vitelline duct; the post-arterial from the duct to the mid-transverse colon. The post-arterial segment, ileum, cæcum and transverse colon occupy the left half of the abdomen; and as rotation proceeds the cæcum passes up to the epigastrium, comes over to the right hypochondrium, and eventually descends to its permanent position in the right iliac fossa. By this manœuvre the duodenum is brought to lie behind the superior mesenteric artery and the colon crosses it in front. In the final stage the cæcum and ascending colon become fixed to the post-abdominal wall, and the small intestine takes its mesenteric support from the 2nd lumbar vertebra to the right iliac fossa.

Failure in rotation, failure in normal adhesion, will lead to pathological conditions which can be diagnosed and treated.

Non-rotation.—If the loop does not rotate, the small intestine occupies the right half of the abdomen and the large intestine the left. The large intestine does not cross the small intestine. The ileum enters the right side of the cæcum; the small intestine is suspended from a short base of attachment to the post-abdominal wall and is in grave risk of torsion. The cæcum may lie at any level in the left half of the abdomen and, despite its abnormal situation, tends to develop adhesions to the neighbouring parts which may eventually compress the duodenum.

Mal-rotation.—By this is understood irregular errors. The cæcum only may rotate. It may lie in the epigastrium or the right hypochondrium, and develop adhesions to the post-abdominal wall. The small intestine has a very short posterior attachment in the neighbourhood of the superior mesenteric artery.

Reversed rotation.—This is a rare type but extremely puzzling on first acquaintance. The intestines reverse clockwise. The duodenum is in front of the transverse colon, behind the root of the superior mesenteric artery. The pressure of the crossing artery may cause obstruction of the transverse colon.

Pathology.—The incompletely attached small intestine is very liable to undergo torsion. The first effect falls on the duodeno-jejunal junction, and the early symptoms of a volvulus are therefore duodenal obstruction. The duodenum becomes distended and the small intestine collapsed. If the condition is unrelieved, infarction of the superior mesenteric artery will follow. At first the small intestine is collapsed, but later, with interference to the blood supply, gas collects and distends the bowel. Ladd (1933) has laid stress on the effect of bands, passing from the cæcum and ascending colon to the lateral abdominal wall, compressing the duodenum in many cases, and these bands are of importance in the surgical treatment.

Clinical features.—All degrees may be found from minor attacks of duodenal obstruction, often recurrent, leading to an erroneous diagnosis of medical disease such as acidosis, to complete and possibly fatal volvulus and gangrene. An attack may occur a few days after birth (volvulus neona-

torum—Dott, 1923). The infant begins to vomit and vomits everything. The vomit is usually bile-stained. The upper abdomen becomes distended due to duodenal obstruction. The lower abdomen is flat at first and only becomes distended in the later stages. Meconium may be passed and sometimes there is melæna. The picture is one of high intestinal obstruction, complete or incomplete.

Diagnosis.—The features of a high atresia are very similar. From the practical point of view it is important to recognize the presence of obstruction and operate immediately.

Treatment.—The stomach is emptied and kept empty by a small rubber catheter. Normal saline with 5 per cent. glucose is administered subcutaneously.

The abdomen is opened under general anæsthesia and a rapid survey is made. In most cases, to understand the precise pathology, it is necessary to allow the whole of the midgut to eventrate. Only thus can the precise arrangement be understood. The rotation, usually clockwise, can be reversed, and the colour of the bowel becomes normal. Ladd insists on the necessity of dividing any abnormal bands that may be present holding the cæcum and ascending colon to the right side of the abdomen. The freed colon should be allowed to pass to the left side of the abdomen.

Minor failures in rotation show themselves in later life. An unfixed mesentery may allow volvulus to occur at any age. Often the attacks—abdominal pain, vomiting, recurrent distension and irregular bowel action—are incomplete and recoverable, and are wrongly diagnosed as a medical condition, e.g. acidosis or cœliac disease. They can be diagnosed by radiological examination with the aid of a barium meal and barium enema. The abnormal position of the small intestine and large bowel can be shown clearly. The treatment is by operation, and the scope of the operation is governed by the findings. It may be impossible to reduce the condition to normal, but the free division of abnormal bands will allow the intestine to float freely. The most constant determining factor in any volvulus is an abnormal adhesion. In less severe deformities it may be possible to rotate the midgut to its normal position and fix the ascending colon to the posterior abdominal wall (Waugh, 1928).

In the case of ***reversed rotation***, in which the superior mesenteric artery crosses and obstructs the descending colon, the anatomical fault cannot be corrected, and a short circuit should be performed between the cæcum and the distal colon.

ATRESIA AND STENOSIS

These may affect any part of the alimentary tract although they are much more common in the small intestine.

Embryology.—In the development of the tract there is at first a distinct lumen, but with epithelial proliferation the lumen becomes obliterated. Then vacuolation occurs and the lumen becomes septate. The vacuoles eventually coalesce and the passage is restored. Arrest of the final stage may lead to a solid portion of bowel, a persistent septum (atresia), or a narrowing (stenosis). Atresia is more common than stenosis.

Pathology.—There are three types:—

(1) The bowel ends abruptly and begins again lower down. There may be a fibrous cord of connexion and a gap in the mesentery. Sometimes the deficiences are multiple.

(2) The continuity of the bowel is uninterrupted, but the distal bowel is small and cord-like.

(3) A septum lined with mucous membrane interrupts the lumen. This is more common in the duodenum.

There is great distension of the proximal bowel which, if unrelieved, will lead to gangrene and perforation. The distal bowel is very small and may not contain any air.

Clinical features.—Persistent vomiting from birth is the salient feature. The abdomen becomes distended, the area being dependent upon the site and extent of the obstruction. The stools may be infrequent or absent. A straight X-ray taken in the erect and in the inverted positions is often helpful. It may show the degree of distension of the intestinal loops and suggest the position of the obstruction.

Treatment.—Operation offers the only hope of alleviation and should be employed in every case.

A small soft rubber catheter should be passed into the stomach to aspirate the contents and keep the stomach empty. Glucose and saline are given parenterally. At operation it may be found that the extent and multiplicity of the abnormalities may be beyond relief but, whenever possible, re-establishment of bowel continuity should be attempted. This is best effected by a lateral anastomosis between the distended proximal and the distal collapsed coil. The disparity of size is considerable and union is facilitated by aspirating the gas and fluid from the distended loop and injecting air and saline into the collapsed bowel. Clamps are inadvisable.

In the after-treatment small daily rectal salines, given gently, will help the contracted distal bowel to dilate.

DUODENAL STENOSIS AND ATRESIA

Duodenal stenosis and atresia deserve a separate paragraph because of their relative frequency, the differential diagnosis from congenital pyloric stenosis, and their curability. The obstructing element may be complete or incomplete. Its most usual site is at the papilla of Vater. It is sometimes extrinsic, the result of abnormal bands, such as have been mentioned as occurring in faults of rotation, but more usually intrinsic—a diaphragm of mucous membrane, the result of incomplete regression of one of the primitive vacuoles. The obstruction may be complete but is sometimes incomplete, and cases are recorded in which the opening in the diaphragm was minute, yet life was prolonged for many years.

Clinical features.—If the obstruction is complete, vomiting begins at birth. Everything the infant takes is vomited, and if the obstruction is below the papilla of Vater, the vomit contains bile. If the obstruction is incomplete and the child survives, visible gastric peristalsis may be seen. In complete atresia or severe stenosis, the infant, unrelieved by surgery, soon succumbs.

Diagnosis.—Hypertrophic stenosis of the pylorus has many similar features,

but in duodenal stenosis, vomiting begins at birth; it is usually bile-stained, and there is no pyloric tumour to be felt. An opaque meal and X-rays will make the diagnosis certain.

Treatment.—The stomach should be aspirated with a fine rubber catheter, and subcutaneous glucose and saline administered. If the obstruction is due to bands, these are divided. If the stenosis or atresia is intrinsic and is situated in the second part of the duodenum, an anterior gastro-enterostomy should be performed. If the obstruction is in the neighbourhood of the duodeno-jejunal junction, a duodeno-jejunostomy is preferable, but it is best not to be too bound by convention. Duodeno-jejunostomy may be difficult, and gastro-enterostomy is relatively easy of performance; and ease makes for good surgery in times of stress.

DIVERTICULA

It is customary now to consider all intestinal diverticula either as duplications of the intestine or as remains of the vitello-intestinal duct—Meckel's diverticulum.

Duplications

These can occur anywhere, from the œsophagus to the rectum. Formerly many were called enterogenous cysts. Lewis and Thyng (1908) were the first to describe embryonic diverticula which normally degenerate and disappear, but on occasion persist. They are characterized by their structure, which is that of bowel musculature and epithelium, not necessarily corresponding histologically to the bowel to which they are attached, and with which they usually, but not always, communicate. They are most commonly found in relation to the ileum. They vary greatly in size from small cyst-like formations to large tubular arrangements within the mesentery.

Clinical features.—The effects they produce depend upon their size. When large, they cause chronic intestinal obstruction with intestinal upset—vomiting, distension and irregular constipation. Acute obstruction may supervene; sometimes melæna, sometimes intussusception. On palpation a mass can be felt which is usually painless and mobile.

Treatment.—Operation is essential. In contrast with true mesenteric cysts which can usually be shelled-out without bowel interference, excision of a duplication often requires resection of the intestine from which it arises or to which it is attached.

Meckel's Diverticulum

Meckel's diverticulum, the remains of the neck of the yolk-sac, is present in 2 per cent. of individuals. It is not surprising that it can lead to a great variety of surgical accidents: indeed a book could be written on the pathology of Meckel's diverticulum alone. A certain amount of generalization is therefore necessary here. It arises from the free border of the ileum, 8 to 40 inches from the ileo-cæcal valve. Its average length is 2 to 4 inches. Its structure is that of the ileum, but it sometimes contains heterotopic tissues, e.g. gastric

mucosa, pancreatic tissue. It may, or may not, have a mesentery. It is sometimes connected with the umbilicus, and it may be patent, leading to an umbilical sinus.

The main dangers are: (1) intestinal obstruction; (2) inflammation; (3) peptic ulcer leading to hæmorrhage or perforation; (4) intussusception.

Diagnosis.—It is not possible to diagnose the presence of a Meckel's diverticulum unless it opens at the umbilicus. It is too elusive for a barium meal to reveal. At the best it can only be suspected as a possible cause of obstruction in the absence of anything more likely, e.g., a previous operation or earlier abdominal tuberculosis. When inflamed it simulates closely appendicitis, and again can only be suspected by intensification of the physical signs—tenderness and rigidity in the umbilical area.

Hæmorrhage is in a different category. If a child or young adult passes blood per rectum in serious quantity without obvious local cause, peptic ulcer of a Meckel's diverticulum should be considered. Heterotopic gastric mucosa in the small intestine may produce a similar condition. There are sometimes localizing features—central abdominal colicky pain and tenderness—but often the bleeding is sudden, profuse and symptomless. A peptic ulcer may lead to a perforation, usually preceded by a hæmorrhage.

An intussusception is sometimes determined by a Meckel's diverticulum. There is no way of recognizing the presence of a diverticulum before operation: it will appear as an interesting finding.

Treatment of a Meckel's diverticulum will be that of the complications to which it has given rise. If met with in the course of a laparotomy, it should be removed because of its potential danger.

MALFORMATIONS OF THE RECTUM AND ANUS

Imperforate Anus

Embryology.—About the sixth or seventh week of intra-uterine life the primitive alimentary canal ends blindly in the cloaca which is separated from the surface by the cloacal membrane. The cloacal membrane becomes divided into the anal membrane posteriorly and the urogenital membrane anteriorly. A depression in the skin occurs—the proctodeum—which grows towards and eventually meets the developing rectum. The anal membrane disappears and the passage to the surface is clear. It will be seen that incomplete development may lead to three main pathological conditions:—(1) The bowel may end high up near the brim of the pelvis; (2) the proctodeum is absent and the gut therefore ends blindly; (3) the anal membrane persists or the anal canal is stenosed.

Fistulæ.—Imperforate anus may be complicated further by the presence of a fistulous connexion of the rectum with the bladder and urethra in the male, and the vagina in the female. They are due to the incomplete closure of the cloacal duct.

Clinical features.—If there is no anal opening and no fistulous connexion, complete obstruction exists from birth. The infant, unrelieved, dies within

a week with distension and vomiting. In some cases the cause is evident: there is no sign of an external opening. In others, the anus may appear normal, but on investigation with the little finger a cul-de-sac is found.

The presence of a fistulous connexion with the urinary or vaginal tract is recognized by the abnormal passage of meconium, and if the opening is large enough, obstructive signs are not present, although chronic obstruction tends to develop in later life.

A plain X-ray examination with the patient in an inverted position will help in assessing the situation of the blind rectal pouch.

Treatment.—In the most simple form of anal atresia with persistence of the anal membrane, incision of the membrane is easily accomplished. If there is anal stenosis, regular dilatation with small bougies for a period of months will be sufficient.

If X-ray examination shows that the rectal pouch is reasonably low down, a perineal operation should be performed. A primitive external sphincter may be evident, and the incision should be planned to use it.

By dissection, keeping close to the hollow of the sacrum, the rectum is reached, freed, brought down to the surface, and stitched to the anal skin without tension, the sphincter being closed around it. If the rectal pouch is high in the pelvis, it is advisable to perform colostomy and wait until the child is much older before attempting a combined operation.

Similarly, with an abnormal fistula, it is better to perform colostomy at once and wait until the child is five or six years old before performing a plastic operation. Too often, attempts at this stage lead to a miserable existence with openings which tend to contract, and with incontinence of fæces. Life with a colostomy is much more endurable and, with the growth of the parts, a plastic repair later is a more controlled procedure.

CONCLUSION

Stress must again be laid on the curability of many of these congenital abnormalities. The improved outlook is due in part to those general pre- and post-operative measures which have characterized all modern abdominal surgery. Decompression of the upper alimentary tract in cases of obstruction by means of the gastric tube, adequate correction of fluid, nutritional and electrolyte losses by subcutaneous or intravenous administration, sometimes blood transfusion, and improved anæsthesia, have all contributed to the increased operability and reduced mortality.

The surgeon should view these abnormalities with optimism, and give the patient a chance whenever faintly possible.

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CONGENITAL ABNORMALITIES OF THE RENAL TRACT

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One of the most common sites for congenital anomalies is in the urinary tract, yet at first sight they appear to be of academic interest only; but I venture to assert that these anomalies are among the most important factors in the causation of disease of the urinary tract. I regard congenital neuromuscular imbalance with its effect on function to be a congenital anomaly and do not reserve the term for structural malformation. Congenital anomaly leads to obstruction. Urinary obstruction and urinary infection go hand in hand, because obstruction means stasis and stasis predisposes to infection. Once infection is established in the presence of obstruction, permanent cure will not be achieved until the obstructive factor is eliminated. In children, at any rate, it is true to say that obstruction and consequent infection are responsible for the vast majority of urological problems, the obstructive factor being, in most instances, due to a congenital anomaly. Many of these anomalies cause disability, apart from infection.

DEVELOPMENT

In order to have a better understanding of these conditions, a few words about development may help. The collecting and excretory parts of the urinary apparatus are developed from separate structures. The collecting part which embraces the posterior urethra in the male (the whole urethra and vagina in the female), the bladder, ureters, renal pelves, calyces and collecting tubules, are outgrowths from the lower end of the Wolffian duct and the anterior vesico-urethral portion of the cloaca. The excretory portion, which embraces the glomeruli and convoluted tubules, is developed separately and later joins the collecting part to form the complete unit. Failure to join is thought to cause polycystic kidney. Multiple ureteral buds account for reduplication of ureters, renal pelves and kidneys and, as the ureters are developed from the Wolffian body which in turn opens into the cloaca, it is easy to understand why ectopic ureters open into the posterior urethra, ejaculatory ducts and seminal vesicles in the male, and the vestibule and vagina in the female. The kidney initially lies in a caudal situation and it acquires vascular connexions at this level. Later it ascends, undergoes rotation, and develops new vascular connexions at a higher level. If the low vascular supply persists, this tethers the kidney in ectopic positions. Persistent low vessels in association with a high kidney are aberrant vessels, and they may com-

press and obstruct the urinary channels. Failure to rotate or excessive rotation, sometimes associated with fusion of the kidneys, accounts for other anomalies.

THE COMMONER URINARY ANOMALIES

Infra-vesical lesions tend to have bilateral effects upon the upper urinary tract, and malformations in the lower urinary tract are accompanied by a high incidence of malformation in the upper urinary tract.

The Urethra

Tight phimosis, stenosis of the external urethral orifice, and *hypospadias* with a pinhole meatus, if allowed to persist, can cause hypertrophy of the bladder and ultimate dilatation of the bladder and upper urinary tract. In a sensitive individual they can cause nervous disturbance of the act of micturition. *Valves of the posterior urethra* are less obvious, yet are not uncommon. If they cause complete obstruction the condition is rapidly fatal, but if, on the other hand, the obstruction is incomplete, they may embarrass the passage of urine for many years, the urinary embarrassment never being properly appreciated. Development of the child is grossly retarded, as chronic back-pressure and infection lead to chronic interstitial nephritis with permanent damage to the kidneys. The urinary tract may not be under suspicion until the distended bladder or pyuria is recognized. The difficulty of obtaining specimens of urine from infants is one factor that prevents earlier appreciation of urinary infection. Also, although there is no resistance to the passage of a catheter upwards through the valve, yet the valve may obstruct the natural flow of urine; thus the presence of a valve is not suspected.

Bladder neck contracture, a neuromuscular defect, is quite common in children. It is sometimes associated with spina bifida, and affected children occasionally have nocturnal enuresis. Bladder neck contracture is the causal factor in acquired diverticulum later in life and should always be eliminated when such a diverticulum is removed.

The Bladder

Congenital diverticulum occurs occasionally. It may obstruct a ureter and cause hydronephrosis. Ultimate infection is inevitable. *Exstrophy* may be associated with other anomalies at a higher level. This may influence treatment. *Urachal remnants* are not common, but I saw one recently in a boy of six years whose complaint was noctural enuresis.

Neuromuscular defects, either atonic or hypertonic, are quite common, the hypertonic condition being marked by a trabeculated bladder of small capacity. Nocturnal enuresis may be a feature. Spina bifida occulta or a nervous lesion may be present. Such cases sometimes benefit from repeated injection of 20 ml. of weak local anæsthetic into the sacral canal.

The Ureter

Agenesis or *aplasia*, if bilateral, is incompatible with life, renal aplasia being present as well. If it is unilateral, the patient appears to be normal;

yet he has but one kidney. This condition must be excluded before radical surgery is carried out.

Reduplication of ureters and kidneys is one of the more common anomalies of the urinary tract and it is a fruitful source of disability. If complete, the ureter from the upper renal element opens at a lower level into the bladder than does its fellow. Most ectopic ureters are reduplicated ureters and, again, it is the ureter from the upper renal pelvis which is ectopic. Conversely, it is generally the upper renal pelvis which is obstructed and this becomes pathological. If reduplication is incomplete it is still a potential source of trouble to the individual. I believe that in such cases peristalsis in the two ureters may not be coordinated, and one interferes with the other.

Ectopic ureters are uncommon, yet they must always be remembered. In the male, they usually open into the posterior urethra or seminal vesicles above the level of the external sphincter, so that the child is continent, yet has some disturbance of micturition, and he may develop vesiculitis or epididymitis. In the female, the opening is generally below the level of the external sphincter, so that there is a constant leakage of urine from the vulva. Despite the fact that there are normal acts of micturition, the leakage persists day and night. In such cases careful examination of the vulva should be made, and intravenous injection of indigo carmine may help in localizing the ectopic orifice. *Retrocaval ureter* is another rare anomaly. In this condition, owing to abnormal development of the inferior vena cava, the ureter passes around it in a spiral manner, causing hydronephrosis.

Stenosis and consequent *ureterocele* obstruct the lower end of the ureter. *Dilatation* may be due to stricture, but it is probably more often due to neuromuscular lesions, either localized spasm or general atony. In the latter instance both upper urinary tracts may be grossly dilated, and gaping ureteric orifices are seen on cystoscopy. Another common site of stenosis is at the pelvi-ureteral junction. The ureter is occasionally *obstructed by blood vessels*, by the ovarian and spermatic vessels at the pelvic brim, the uterine vessels at its lower end, or an aberrant renal vessel at the pelvi-ureteral junction.

The Kidney

Agenesis and *aplasia* have been mentioned. *Solitary cysts* cause trouble by their bulk.

Polycystic kidney is thought to be due to defective union between the secretory and collecting elements of the kidney. The condition is sometimes present at birth, in which case the child dies within three months; but as a rule the victim is aged between forty and sixty before he has symptoms. Once diagnosed, the patient rarely lives for more than ten years, and 50 per cent. die within four years. If he does not succumb to some intercurrent disease, he will die of uræmia, and surgical interference merely expedites the fatal issue. The patient may have pain due to the weight of the kidneys, colic due to hæmaturia, which occurs in 20 per cent. of cases, or pyuria as a result of infection which may lead to stone formation. The enlarged nodular

kidneys are usually palpable. The condition is usually bilateral, which distinguishes it from renal neoplasms, which are rarely bilateral.

THE CLINICAL PICTURE

It is unfortunate that in the majority of cases of congenital anomaly of the urinary tract the symptoms are not only vague but are, in fact, misleading. In particular this is true of lesions of the *lower urinary tract*. In the early stages these are painless, and embarrassment of micturition is the only sign. This is not obvious in infants. Pain appears with a complication such as infection or stone. The syndrome is really that of progressive renal failure, as back-pressure is referred through the bladder and ureters to the kidneys. The mental and physical development of the patient is retarded, and he is undersized, pale and always ailing. Later, the embarrassment of micturition may be masked by frequency and overflow incontinence from a lax, distended bladder which is not easily detected by palpation, but can be percussed, or felt bimanually between a finger in the rectum and a hand on the abdomen. If uninfected, the urine presents no gross abnormality; if infected, this provides a valuable clue. X-ray investigation is hampered by uræmic gaseous distension of the bowel; when this is coupled with poor renal function, intravenous pyelography has its limitations. Direct vision cystoscopy (or urethroscopy) may reveal the causal lesion, and it certainly displays the distended trabeculated bladder; retrograde pyelography defines the dilated ureters and renal pelves. Stones may form in these dilated passages. The advent of infection may introduce a pyrexial element that makes things even more difficult, and the progress of the disease is hastened. When the obstruction is slight in degree, it may not become evident until adult life, when a bladder-neck obstructive syndrome, diverticulum of the bladder, stone in the bladder or upper urinary tract, and other lesions become manifest.

When the *upper urinary tract* is affected the lesion is, as a rule, unilateral, and the clinical picture is quite different. Uræmia is not the dominant feature, and the patient may be adolescent or even adult before he is affected to a material extent. *Pain* is a much more prominent symptom. This may take the form of recurrent attacks of renal colic, but more often it is a vague recurrent pain in one or other iliac fossa, the epigastrium, or hypogastrium. It may be dull or acute, persistent or intermittent, possibly accompanied by gastro-intestinal upsets with indigestion, vomiting, constipation or diarrhœa. In children and adults the doctor's attention is diverted to the gastro-intestinal tract, and only too often the patient is subjected to laparotomy on a diagnosis of appendicitis, with no relief. The subsequent pain is attributed to 'adhesions'. When infection supervenes, the symptoms and physical signs may point more definitely to the upper urinary tract and the urine provides positive evidence. In many instances, however, the clinical picture remains obscure and there are no specific urinary symptoms.

I make a practice of carrying out a urological investigation on all children who present with chronic or recurrent abdominal pain, which has not been

definitely diagnosed as appendicitis during an acute phase. I have been rewarded by the discovery of many unsuspected congenital anomalies of the urinary tract, including cases of hydronephrosis, ectopic kidney, reduplicated ureter, and one case of retrocaval ureter.

In some instances, when an anomaly of the urinary tract has been disclosed, there may still be some doubt whether or not it is responsible for the patient's symptoms. Under these conditions I believe that 'diagnostic appendicectomy' is justifiable.

DIAGNOSTIC PROCEDURE

There is no need to stress the importance of an accurate history and a careful physical examination, including examination of the external genitalia. The history and physical examination may be helpful, but only too often they give no positive clue. In all cases of undiagnosed chronic or recurrent illness, careful examination of the urine is essential, and it is important that an uncontaminated specimen be obtained and sent to a laboratory, even though the patient has no symptoms directing attention to the urinary tract. Difficulty in obtaining such a specimen from very young children often leads to this examination being omitted. Female children should be catheterized, a rubber catheter being used. I personally prefer a small Tieman's catheter which is fairly stiff and is under better control. The catheterization must be carried out with adequate illumination. In the case of male children who are sufficiently intelligent, a mid-stream specimen is sufficient.

For this a sterile container with a sterilized filter funnel is employed. The prepuce is retracted, the glans swabbed; the child passes a few ml. of urine to cleanse the anterior urethra; this fraction is discarded, but the remainder is passed *via* the filter funnel into the sterilized receptacle. The interior of the filter funnel and receptacle should not come into contact with the skin of the penis. In the case of younger children, a sterile test tube may be fixed over the penis by adhesive strapping, the head of the bed being elevated until a satisfactory specimen has been obtained.

It may be necessary to catheterize a young male child and, occasionally, when an uncontaminated specimen must be obtained and other methods have failed, it may be justifiable to employ a general anæsthetic. A full blood count and a blood urea estimation should be made. After a straight X-ray of the kidneys, ureters and bladder, an intravenous pyelogram is obtained, and if sufficient information has not been gleaned to make an accurate diagnosis, then cystoscopy accompanied by the intravenous injection of indigo carmine is carried out, the excretion of the dye from both ureters being noted. Direct vision cystoscopy may be necessary to examine the posterior urethra and the bladder neck. Retrograde pyelography, including a film taken ten minutes after injection of the opaque medium and withdrawal of the ureteric catheters, is the next step. If a substantial amount of the medium is retained, this indicates a pathological degree of stasis, and it also demonstrates the site of the obstruction. On occasion, X-ray examination of the bladder filled with opaque medium or air is important, reflux into the ureters being noted.

Important observations that can be made in the patient's home and which

provide excellent tests of renal function are: the total urinary output in twenty-four hours, with the quantity and specific gravity passed for twelve hours by day and twelve hours by night; the ability of the kidney to eliminate water, and its capacity to concentrate the urine when intake of water is restricted.

TREATMENT

This is directed towards the relief of obstruction and stasis. In many instances this involves highly specialized surgical procedures carried out under a chemotherapeutic and antibiotic umbrella. Destruction of posterior urethral valves by diathermy, resection of the bladder-neck, excision of vesical diverticula, dilatation of stenosed ureters, partial nephrectomy to remove the pathological portion of a reduplicated kidney, nephro-ureterectomy when kidney and ureter are grossly and irrevocably dilated and infected, plastic procedure at the pelvi-ureteral junction, division of the isthmus in horseshoe kidney, removal of an ectopic kidney, withdrawal of a retrocaval ureter from its abnormal relationship to the vena cava, are measures that are adopted. Circumcision, incision, and dilatation of a stenosed external meatus may be curative. Injection of pituitrin (0.5 ml. daily for several weeks, 0.5 ml. on alternate days for several weeks, 0.5 ml. twice per week for several weeks, and finally, 0.5 ml. at weekly intervals for several weeks) may give tone to an atonic urinary tract, eliminate stasis, and cure persistent urinary infection. Antispasmodics such as atropine may improve spastic conditions, relieve symptoms, and get rid of residual urine.

Despite most careful investigation, some cases of dysfunction due to congenital anomaly defy diagnosis and, even when diagnosed or suspected, defy the ability to offer successful treatment. Recurrent exacerbations of infection in such cases must be treated by sound therapeutic measures, and the treatment be begun by determining the sensitivity of the infecting organism to the various chemotherapeutic and antibiotic agents; thus, valuable time is not wasted by employing a weapon that is blunted for this particular organism. An adequate fluid intake, acidification of a persistently alkaline urine, various mandelic acid preparations, hexamine or methenamine in its modern guise, the sulphonamides, the antibiotics, all have their place in the control of acute and chronic phases of infection.

CONCLUSIONS

Congenital anomaly in the urinary tract, by causing obstruction and stasis, is an important factor in the production of disease. A careful study of these anomalies is necessary if adequate treatment is to be employed. If there is no stasis, acute urinary infections will usually clear up spontaneously. Thus, all cases of acute urinary infection which resist treatment for longer than a few weeks, all cases of chronic infection, and all cases of recurrent infection, should be submitted to a full urological survey.

I emphasize the fact that many cases of infection within the urinary tract,

particularly in children, present few urinary symptoms, and the pain associated with urinary obstruction is probably more often attributed to the appendix than to the proper source. Thus, the possibility of a vague illness or an acute abdominal syndrome being caused by a lesion in the urinary tract should for ever be in the diagnostician's mind. The fact that more than 50 per cent. of patients with hydronephrosis have gastro-intestinal symptoms illustrates this point.

ILLUSTRATIVE CASES WITH SKIAGRAMS TO DEMONSTRATE THE ANOMALY

(1) This female child, aged two-and-a-half years, was operated upon in infancy for a meningocele. Her present symptoms are overflow incontinence from a distended, trabeculated bladder which results from neuromuscular imbalance (cord bladder). The pyelogram shows gross dilatation of both upper urinary tracts (fig. 1).

(2) This male child, aged six years, presented with nocturnal enuresis. Cystoscopy and cystography showed a bilocular bladder, the upper loculus being, in all probability, a urachal remnant (fig. 2).

(3) A girl aged ten years had persistent right iliac pain which was attributed to appendicitis. She had no urinary symptoms. Investigation showed reduplicated ureters on the right side. The ten-minutes' emptying film demonstrates a hold-up at the junction of the reduplicated ureters (fig. 3).

(4) This girl, aged ten years, had recurrent attacks of right iliac pain, but no urinary symptoms. The diagnosis was appendicitis. Her urine contained *B. coli*. An intravenous pyelogram showed dilatation of the right renal pelvis (fig. 4a). A retrograde pyelogram showed deviation of the ureteric catheter towards the midline (4b). There was ten-minutes' retention of the opaque medium, and the site of obstruction overlay the vertebral column (4c). A diagnosis of retrocaval ureter was made preoperatively; this was corrected by a plastic procedure. The postoperative intravenous pyelogram (4d) is shown. Two years after operation she is symptom-free and her urine remains sterile.

(5) This boy, aged twelve years, had recurrent attacks of left renal colic. I considered this to be due to spasm at the pelvi-ureteral junction; an opinion confirmed at operation, and his symptoms were corrected by a plastic procedure. Pre- and post-operative intravenous pyelograms are shown (fig. 5, a and b).

(6) Recently this girl, aged six years, presented with a diagnosis of appendicitis: recurrent attacks of right iliac pain accompanied by diarrhœa. As a rule she was constipated. There were no urinary symptoms. The intravenous pyelogram (fig. 6a) shows right hydronephrosis. The retrograde pyelogram (fig. 6b) demonstrates obstruction at the pelvi-ureteral junction. She will be admitted for a plastic operation.

(7) This adult female shows stone formation in the lower elements of bilateral reduplicated kidneys. Left heminephrectomy was performed. Shortly she will be submitted to right heminephrectomy. The calculi in the lower pelves completely fill the pelves and calyces (fig. 7).

(8) This adult male has had recurrent attacks of abdominal pain and hæmaturia for several years. An intravenous pyelogram (fig. 8a) showed a normally situated right kidney. The left kidney was obscured by the vertebral column and was not recognized. On cystoscopy it was noted that the right ureteric orifice was hidden by a granuloma. The left ureteric orifice was visible; it was catheterized and a retrograde pyelogram obtained (fig. 8b). The left kidney was ectopic. It was removed and was found to be adherent to the lower pole of the right kidney above, and the bladder below, and in fact had caused the granuloma of the bladder noted at cystoscopy. This is a so-called sigmoid kidney.

(9) With her first pregnancy this woman had symptoms suggesting right pyelitis. Investigation elsewhere led to a diagnosis of left renal tuberculosis, as the left kidney appeared to be functionless, and organisms like tubercle bacilli were found in the urine. I found no evidence to support this diagnosis and explored the left kidney and found it to be absent. The intravenous pyelogram shows two anomalies —malrotation of the right kidney and agenesis of its fellow (fig. 9).

FIG. 1

FIG. 2

FIG. 3

FIG. 4a

FIG. 4b

FIG. 4c

FIG. 4d

ABNORMALITIES OF THE RENAL TRACT

FIG. 5a

FIG. 5b

FIG. 6a

FIG. 6b

FIG. 7

FIG. 8a

FIG. 8b

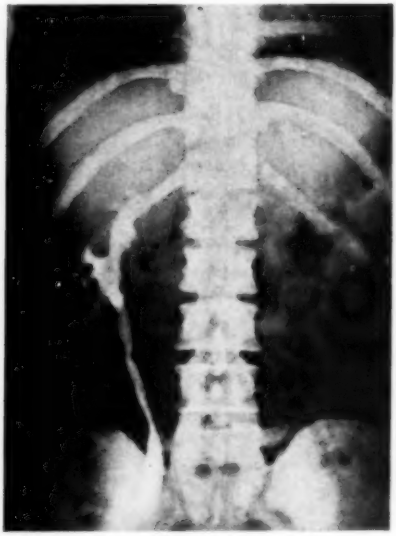

FIG. 9

ABNORMALITIES OF THE RENAL TRACT

CONGENITAL ABNORMALITIES OF THE NERVOUS SYSTEM

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Many diseases of the central nervous system are inborn inherited states. In this article we are concerned solely with abnormalities (malformations) present at birth in that system, whether they be due to a defect in the germ plasma, to a fault in the fœtal environment, or to both.

Table 1
Malformations in 2,936 Births in the Aberdeen Maternity Hospitals in 1949

Malformations	Totals	Stillborn	Neonatal death	Alive at one month
Spina bifida cystica	6	—	4	2
Anencephalus	4	4	—	—
Hydrocephalus (including 1 with Klippel-Feil syndrome)	4	2	2	—
Talipes alone	7	—	—	7
Mongolism	5	—	2	3
Acrocephalosyndactylism	1	—	—	1
Absent eye	1	—	—	1
Hare-lip and cleft palate	5	1	1	3
Congenital heart defect	3	—	1	2
Gross multiple defects	3	—	3	—
Deformities of limbs	4	1	1	2
Ectopia vesicæ	1	—	—	1
Patent urachus	1	—	—	1
	45	8	14	23

It is universally found that the nervous system is one of the most common sites of abnormalities in the body (table 1), and that increased frequency of occurrence is associated with primogeniture, and in some instances with advancing age and parity of the mother. One malformation may coexist with others in the nervous system itself, or in different organs, such as the lips, palate, skeleton, heart and umbilicus. Some of the infants are born prematurely, especially if hydramnios be present; some are stillborn at term, and many die soon after birth.

The malformations may in many cases be genetic in origin, but so much has been learned in recent years of the effects of maternal infections and other environmental conditions on the growing fœtus that care must be exercised not to ascribe familial abnormalities to genetic causes without adequate proof. Certain it is that many cases are familial, e.g. spina bifida, and that in a given family babies born following one with a malformation of the nervous system run a slight risk of being malformed too, and, indeed, of having the same malformation. It is possible that the common abnormalities are transmitted as recessives, e.g. spina bifida, anencephalus, and talipes; others, like ptosis of the eyelids and the neurofibromatoses, as

dominants. But the mode of transmission may vary from pedigree to pedigree. Knowledge is slowly accumulating about the causation of abnormalities, but in most cases detailed family and personal histories give no clue. The gestation, too, may have been perfectly normal and we are left speculating and wondering. We turn to the normal baby and admire afresh 'the finished pattern without fault'; but it behoves us to continue our search for the causes of abnormalities and the related conditions of stillbirth and prematurity.

TYPES OF ABNORMALITIES

The most common types are anencephalus, spina bifida, and hydrocephalus, occurring separately or in combination. The other types are many in number and varied in character. Only the more important ones will be mentioned.

Defective growth.—This may vary from a small local defect in growth to absence of large parts of the brain. Sometimes a local defect of the cortex is found and in others there is widespread aplasia of the cortex. Experience with encephalography in mental defectives shows that the great majority of them have defects in cerebral development. The cerebellum, the corpus callosum, the basal ganglia, the occipital lobes, indeed any part of the brain may be partly or wholly absent with, in some cases, corresponding symptoms which are not often apparent at birth, so that it is difficult in later infancy or childhood to decide if the symptoms and signs in a case are due to congenital abnormality or to damage to the brain at birth. Absence of the cranial nerve nuclei is occasionally seen, the third and the seventh being the ones most commonly found defective.

Overgrowth.—The brain may be very large and gliotic in macrocephaly and the head at first sight may look like that of hydrocephalus, but the head is less globular and air encephalography reveals ventricles of normal size. Mental growth is slow and incomplete.

DEFECTS ASSOCIATED WITH INCOMPLETE DORSAL CLOSURE OF THE NEURAL TUBE

Cerebral.—When there is entire failure of the cephalic part of the tube to close, an associated ***anencephalus*** is found when the vault of the skull is absent (complete cranioschisis) and the cerebral hemispheres are absent or rudimentary. Spina bifida may be associated. The condition is commoner in females and in the firstborn, and ends in stillbirth in almost every case. An odd one may live for a few hours. ***Iniencephalus*** is another condition, rare but probably more common than has been reported, which occurs along with cerebral and spinal meningocele. The occipital bones are defective, the head is markedly retroflexed, and there are varying degrees of cranioschisis and rachischisis, with meningocele. It occurs mostly in females, and they are often born of older mothers. Internal malformations may also be present, and the end is stillbirth.

In lesser degrees of cranium bifidum a ***meningocele*** may be found where only the membranes covered by skin protrude through a small opening in

the skull to form a sac, usually filled with fluid; or a *meningoencephalocele* with a larger opening in the skull and a sac covered by normal or atrophic skin and containing fluid and part of the brain tissue, with, it may be, part of the ventricular system. Hydrocephalus is often present and sometimes spina bifida, club foot and other abnormalities. The swellings in these cases vary very much in size; they are soft, obviously contain fluid, and may pulsate; they occur almost always in the midline and especially in the occipital and frontal regions. If the swellings are large, the rest of the head may be visibly small. The fontanelle may be made to bulge by pressure on the sac, but this procedure should be done carefully. Special tests, such as the introduction of air, may be needed to tell whether or not the sac contains brain tissue, but these should be done only by an expert. Many of the babies with large sacs die soon after birth, some with medullary disturbance and others with meningitis following rupture of the sac.

Some of the simple meningoceles are operable, but the prognosis given even in these must be guarded as there may be other cerebral defects present that will declare themselves later, or a hydrocephalus that becomes apparent only after operation. It is not easy to decide if operation is advisable and when it should be done. The danger of meningitis following operation is less since the introduction of the newer drugs and antibiotics, but it is still considerable. Cases with gross defects in other systems should be left alone. Operation is best postponed for several months after birth, and in the meantime the sac should be kept clean and protected.

Spinal.—Most congenital cord defects are associated with a spina bifida, and various degrees of the latter occur, as in the cases of cranium bifidum. There may be *complete rachischisis*, with the spinal cord showing as a mere red velvety ribbon lying in a red vascular groove. Such infants usually die soon after birth. More commonly the bony defect of the neural arch is less complete and the babies are seen to have a cystic sessile swelling, *spina bifida cystica*, containing cerebrospinal fluid. Some of these are *meningoceles* with a fairly normal cord and nerve roots lying in their proper places; others, more common, and usually in the lumbosacral regions, are *meningomyeloceles* in which the displaced cord is attached to the surface ectoderm and spinal fluid gathers anteriorly to the cord. In this latter group the dysplasia of the lumbar spinal cord leads to weakness of the sphincters and of the legs, especially the muscle groups of the lower legs. The skin of the sac is often normal in the simple meningoceles but in the others there may be a central area, elliptical in shape, parchment-like, and liable to ulceration with resultant meningitis. In almost all cases of meningomyelocele, at birth or soon afterwards, there is a coexistent hydrocephalus; and at necropsy it is the rule to find the *Arnold-Chiari malformation*, in which a tongue-like prolongation of the cerebellum (the Arnold formation) overlaps and is firmly bound down to the greatly elongated medulla (the Chiari formation), so that spinal fluid cannot flow back into the cerebral subarachnoid space, as the cerebellar process, the elongated fourth ventricle, and the elongated medulla fill the foramen mag-

num. Very little fluid is absorbed in the spinal theca, and it is assumed that the spina bifida cystica, the Arnold-Chiari malformation and the hydrocephalus are all due to failure of absorption of the fluid in the cerebral subarachnoid spaces to which it cannot gain access. Club foot, usually equinovarus, is sometimes present in spina bifida cases; and there may be abnormalities of other systems, such as hare-lip, ectopia vesicæ and syndactyly.

Simple meningoceles often do well, and the sac, unless it is very thin, can be removed when the child is three or four years old, if it has not contracted by that time. If the meningomyelocele babies are left alone many die of meningitis following ulceration of the sac; in a few the sac ruptures suddenly; some survive with hydrocephalus and paralysed legs; some are carried off by intercurrent infections; and in a few we have seen a small sac shrivel up and become hard and fibrotic after being inflamed. At all times it should be remembered that the spina bifida cystica coexists with a lesion higher up in the nervous system. Operation on the sac is sometimes followed by an increase in the hydrocephalus, and sometimes by increased weakness of the legs. Meningitis is also a possible sequel. It is difficult to give advice on possible surgical treatment. We advise against operation if gross hydrocephalus is already present, if there is loss of power of the legs, if there are gross abnormalities in other systems, and if the infant is very malnourished.

Cases of *spina bifida occulta* have, as a rule, no abnormality of the central nervous system. It is a common chance finding in radiography of healthy persons, indeed in 5 per cent. of them in some reported cases. It may be found more commonly in enuretics who have never had bladder control.

INTERNAL HYDROCEPHALUS

If this is congenital it is due to a defect in the development of the cerebrospinal fluid system which prevents the normal circulation of the fluid and its ultimate absorption. Normally, the fluid secreted by the choroid plexuses goes from the lateral ventricles through the foramina of Monro into the third ventricle, thence through the narrow aqueduct of Sylvius to the fourth ventricle. From there, where more fluid is secreted, the circulation continues by the foramen of Magendie and the lateral foramina of Luschka to the cisterna magna, and then under the base and up over the convexity of the brain in the subarachnoid channels until it is finally absorbed into the venous sinuses. As already noted, only a small amount of the quantity of fluid that finds its way into the spinal spaces is absorbed. Obstruction of the flow at or above the foramina of the fourth ventricle will give rise to a non-communicating hydrocephalus, for the fluid in the ventricles cannot enter the spinal subarachnoid space, and special dyes put into the lateral ventricles will not be recoverable on lumbar puncture. Obstruction in the fluid pathways distal to the foramina gives a communicating type of hydrocephalus.

The congenital abnormalities that can cause internal hydrocephalus are many and varied. I have seen the foramina of Monro blocked by a neurofibromatous mass. Apparent blockage of the foramen of Magendie by a mem-

brane is sometimes seen, but the exact state of affairs is often difficult to define at operation, even by the expert neurosurgeon; and more descriptions of detailed necropsy findings would be helpful to all interested in the problems of hydrocephalus. Most often the obstruction occurs in the aqueduct of Sylvius and the congenital defect may be poor formation of a channel, often with forking into two narrow dorsal and ventral branches. Less commonly the aqueduct is occluded by a neuroglial septum; simple narrowing of it is rare. Gliosis of the duct is probably not a developmental error. As already mentioned (p. 463), hydrocephalus and spina bifida cystica are often found together, and with them an Arnold-Chiari malformation.

Hydrocephalus occurs with equal frequency in the two sexes and has an association with increased parity and age in the mother. It may cause uterine death or lead to abnormal delivery by craniotomy, or by Cæsarean section if this is considered justifiable. Often the head appears normal at birth but enlarges soon thereafter. When the enlargement is delayed, it will be necessary to prove that this is due to a congenital defect and not to subdural hæmatoma, toxoplasmosis or a neonatal meningitis. Subdural hæmatomas are more common than has been supposed, and are amenable to surgical treatment. Of the cases of hydrocephalus which survive the neonatal period, many die later in the year, after weeks of malnutrition. In an occasional case the process of enlargement of the head ceases and the child survives, albeit mentally impaired. Congenital syphilis plays no part in the etiology of hydrocephalus, and the subject should no longer be viewed through a syphilitic fog.

Before considering *treatment* in any case it is necessary, so far as possible, to establish the exact pathological state of affairs by such measures as air encephalography and injecting dye into a lateral ventricle and trying to recover it by lumbar puncture. This done, the question of operation will arise, for no other treatment will help. Ethical as well as medical considerations will present themselves. Surgical treatment is usually disappointing.

In non-communicating cases the third ventricle has been opened in an attempt to encourage circulation of the fluid to the basal cisterns. Membranes occluding the foramen of Magendie have been sought for and removed. Decompression of the fourth ventricle and the medulla has been tried. I have recently seen the lumbar theca drained by polythene tubing into the normal ureter of a malformed kidney. In the common case with spina bifida cystica and a low degree of hydrocephalus no surgical operation is advised if the legs and sphincters are paralysed. In all cases operation should be postponed for as long as possible, but not if the wall of the sac is thin or the hydrocephalus is increasing. Probably the best surgical treatment is removal of the sac followed in a few weeks by decompression of the medullary area by removal of the posterior arches of the upper cervical vertebræ and of part of the foramen magnum and occipital bone.

CONGENITAL TUMOURS

These are not common. *Capillary angiomas* of the cortex and of the meninges

are sometimes suspected when there is a similar condition of the overlying skin. Later in childhood they may cause symptoms; they often calcify and so give skiagraphic signs. Similar vascular tumours occur in the spinal cord.

Dermoids and *teratomas* are occasionally met with in the newborn. *Neurofibromas* of the nervous system should be kept in mind when the typical pigmentation areas or tumours of the skin are present.

FIG. 1.—Hydrocephalus in a fœtus. Breech presentation. *(By courtesy of Dr. G. P. Milne)*

FIG. 2.—Anencephalus in a fœtus.

OTHER CONGENITAL ABNORMALITIES

Certain entities such as *mongolism*, *microcephalus* and *amyotonia congenita* have characteristic defects in the central nervous system.

DIAGNOSIS OF CONGENITAL ABNORMALITIES BEFORE BIRTH

Congenital abnormalities may be suspected if the mother has already had one abnormal child. It will be remembered that certain of the abnormalities are more common in elderly multiparæ. The presence of hydramnios should always suggest the possibility of fœtal malformations, and in particular the common ones of the nervous system. Abnormal presentations and failure of the head to go into the pelvis may be found with hydrocephalus.

Many of the abnormalities of the nervous system are associated with

skeletal changes, and so good modern radiology will often reveal them. *Hydrocephalus* shows an abnormal vault of the skull (fig. 1) and sometimes craniolacunia. It should be remembered, however, that the latter can also occur in normal babies. *Spina bifida* shows as a broad spine with defective laminæ. The relationship of the spine of the fœtus to the wall of the uterus may be altered. Hydrocephalus and spina bifida will sometimes be associated. *Anencephalus* gives an easily recognized picture (fig. 2) with its absence of the cranial vault. An *occipital encephalocele* may give an eccentric vertex presentation and the bifid cranium may be seen. *Iniencephalus* with its marked retroflexion of the head is recognizable. Gross rib defects sometimes go with spina bifida and can readily be seen.

CONCLUSION

Congenital abnormalities of all kinds are common and especially those of the nervous system. Their treatment is unsatisfactory. Prevention of some types might be possible by earlier marriage and earlier child-bearing.

The study of malformations, of prematurity and of stillbirth must be pursued energetically by all concerned with children and mothers, and the various workers should correlate their knowledge and experiences. Light on the dark subject may come from an unexpected source, but we should be ready to receive it.

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CONGENITAL ABNORMALITIES OF THE LOWER LIMBS

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It is not beyond the realms of possibility that in the course of a comparatively few years we may gain such insight into the factors responsible for congenital defects that we shall be able materially to reduce the number of children crippled from birth. In the meantime, however, it behoves us to minimize the effect of such crippling by giving efficient treatment at the appropriate time. To assist in achieving this aim is the purpose of this article.

CONGENITAL DISLOCATION OF THE HIP

Early recognition influences the prognosis of this condition so profoundly that it would not be unreasonable to X-ray every child within three months of birth. It is often possible at such an age to effect reduction and to promote complete normality without manipulation and all that it involves. The later treatment is started the more slender becomes the prospect of a normal hip, and the more severe and prolonged the treatment has to be. It is consequently of paramount importance to detect the abnormality at as early an age as possible. Detection depends upon suspicion, and it is appropriate therefore to consider what peculiarities may attract attention. Naturally they vary, and it is convenient to consider them under various headings:—

Unilateral dislocation.—The leg ought to appear shorter than its fellow. The shortening is usually not considerable and may escape attention, but the disparity in the level of the knees is suggestive, and the appearance of an upward shift of the thigh in relation to the pelvis is significant (fig. 1). It must be remembered that the femur, and with it the thigh, is also displaced outwards, and the impression that the thigh is farther from the midline than its fellow should not be disregarded. This is, of course, responsible for the appearance of a space between the uppermost inner aspects of the thighs with the bias towards the affected hip (fig. 1). An extra crease on the inner side of the thigh (fig. 1) is often associated with the dislocation, but I find that as a rule asymmetry of the buttock, thinness of the affected thigh, and alteration of the movement of the hip do not play much part in early detection.

Bilateral dislocation.—It will immediately be appreciated that asymmetry ceases to catch the eye. Both hips are displaced and therefore both thighs. One leg is not necessarily shorter than the other, and in a fat, chubby baby the upward shift of the thighs may not be noticeable. The outward shift of both thighs causes a noticeably wide perineal space, and this is about

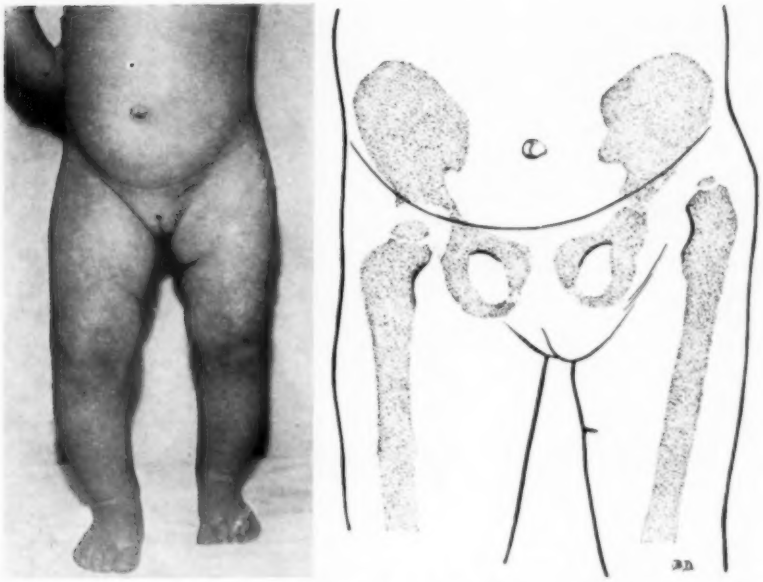
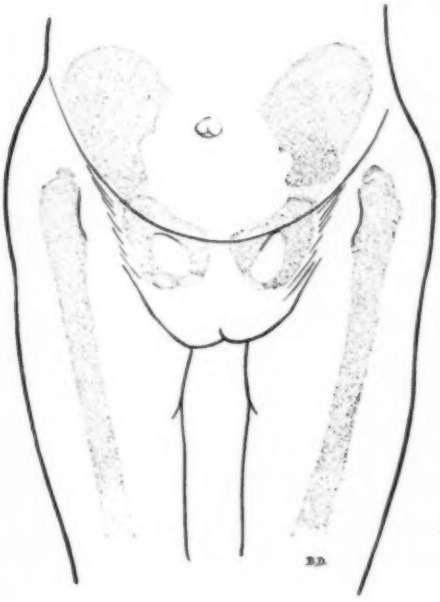


FIG. 1.—Congenital dislocation of the left hip: (a) Clinical photograph; (b) diagram indicating the position of the bones.



the only feature which may arouse suspicion (fig. 2). It is not surprising that the diagnosis of bilateral dislocation is usually made at a later age than is the case in unilateral dislocation.

Subluxation.—By this term we mean that the acetabulum is defective (fig. 3) and shallow: that the head of the femur is displaced towards the upper rim of this shallow cup but the articular surfaces have not lost contact. At the age we are discussing there is no feature which will attract

FIG. 2.—Bilateral congenital dislocation of the hip. Diagram showing the position of the bones in relation to the soft tissues.

attention, and it is only by accident that the defect is diagnosed before the child walks.

Leaving the question of very early diagnosis and passing to the stage when the child first begins to walk, suspicion will be aroused in all three of the above categories by a limp, although a child with a subluxation may limp so slightly as to escape attention. Usually a child with a unilateral or bilateral dislocation will begin walking rather later than normal and will, of course, limp in a characteristic manner. A unilateral dislocation causes a typical dip to the affected side: bilateral dislocation causes a dip to each side alternately, giving rise to the typical 'waddle' with the shoulders thrown back and with more or less marked lordosis.

Diagnosis.—In my view the practitioner is not called upon to make an exact diagnosis. It is sufficient for him to be suspicious, and on suspicion to refer the child to an orthopædic surgeon. He may, for his own satisfaction,

FIG. 3.—Congenital dislocation of the left hip with subluxation of the right hip : (a) Before treatment; (b) condition three years later. Conservative treatment only.

demonstrate the shortening, the hollow in the upper part of Scarpa's triangle due to the absence of the head from the acetabulum; the flattening of the buttock, the easily palpable tuber ischii and the upward displacement of the trochanter; and he may even feel the displaced head. But he will derive most help from the sign called 'telescoping'. To elicit this, one hand is placed firmly on the pelvis so as to detect any slight movement, and the other grasps the lower end of the femur just above the knee. Whereas normally movement of the 'knee hand' is transmitted immediately to the 'pelvic hand', the dislocated hip breaks the continuity of bone between the two hands, and the knee hand can move half an inch or so towards the pelvic hand and then away from it before any movement is appreciated. The X-rays are usually diagnostic, and it would be a bold and foolish orthopædic surgeon who refrained from X-raying the hip of a child with a suspicious limp.

Treatment.—The diagnosis having been established, treatment varies in detail according to the age, but the general principle remains the same.

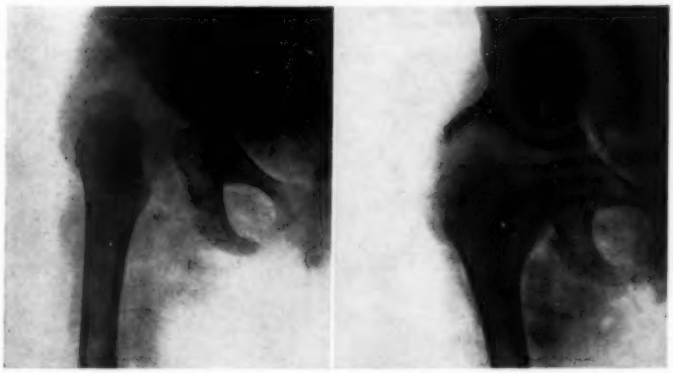


FIG. 4.—Congenitally dislocated hip in which the acetabulum failed to develop; (a) Before operation; (b) six months after operation.

Reduction is obtained in the younger child by abduction and internal rotation in some simple apparatus, and in the older children by manipulation under an anæsthetic. The reduced position must then be retained long enough for the head of the femur and the acetabulum to fit one another. Growth is necessary for this to occur and therefore time must elapse. It is surprising how quickly the mutual moulding occurs, but rarely less than a year is safe. Various techniques are employed, but splinting in some form is usual, and plaster of Paris is the most common form of splinting during this period. Freedom, with activity of the hip muscles but without weight-bearing, is then allowed for a period of about three months. Thereafter walking is gradually allowed until the gait is normal. If the acetabulum does not develop, dislocation may recur and it may be necessary operatively to repair the defect in the acetabulum (fig. 4).

After the age of three years the programme outlined, although still often possible, becomes more difficult to carry out, and good movement of the joint is more difficult to achieve. About the age of five years the prognosis deteriorates markedly. Closed reduction may prove impossible and open re-

FIG. 5.—Bilateral congenital talipes equino-varus (untreated).

FIG. 6.—Complete correction by progressive moulding without anæsthesia. Retention by strapping (the mother believed in heliotherapy and the white bands are the parts covered by strapping and were not burnt by the sun).

duction is called for. By applying traction to the leg, reduction is facilitated, but in any event stiffness of the hip commonly ensues. To a large extent the stiffness gradually disappears, but a full range of movement is hardly likely. My own feeling, however, is that even such a hip is better than one which is dislocated, and only in a late neglected case of bilateral dislocation would I advise that the limp and disability be ignored, and operative interference be reserved to deal with pain and disability later on in adult life.

CONGENITAL TALIPES EQUINO-VARUS

The second congenital defect on the cure of which early treatment has a profound influence is club foot. The most common type, the only one that will be dealt with here, is talipes equino-varus (fig. 5).

It will be seen that the foot is plantar-flexed and inverted and the forefoot is adducted. The degree of deformity varies greatly. At the one extreme is the foot of which the sole faces inwards and the toes point towards the midline; at the other, the sole faces directly backwards and the toes point up the inner side of the calf. There is no particular difficulty in recognizing the condition, provided the position of the feet is judged when the knees are pointing

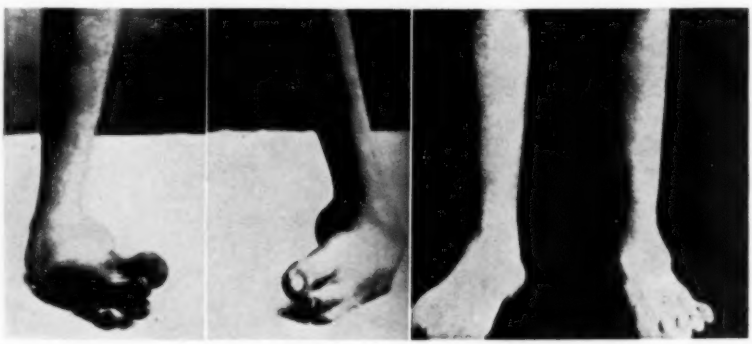


FIG. 7.—Congenital talipes equino-varus in which a wedge tarsectomy yielded a good result.

forward in the anatomical position. A severe deformity is never overlooked. The danger lies in assuming that a mild deformity is merely due to uterine posture and will disappear naturally—'The doctor said he would grow out of it, Sir'. I believe that no practitioner should take the responsibility of ignoring even the mildest deformity of the foot. Far better to refer for a second opinion innumerable, mildly abnormal, postural types than to ignore one fixed deformity. Only the inexperienced orthopædic surgeon will smile at the doctor's fuss. It is a mistake to be afraid to be wrong. The degree of deformity is no guide to the prognosis. Sometimes the most distorted foot will yield easily, and all feet will yield more easily to corrective moulding in the child of, say, a month than in the child of, say, six months. By beginning treatment within a day or two of birth most feet can be made normal before six months of age, and it is then merely a question of keeping them so while growth proceeds.

FIG. 8.—'Postural' calcaneus.

It is often possible to complete correction without resorting to anæsthesia and forcible moulding. Of course, in the first few weeks gentle digital moulding is all that is necessary. Every little gain is held by light bandaging and splinting. Moulding under anæsthesia becomes necessary only if, after about three months, progress is checked. The exact technique of moulding and of retention is immaterial provided it is effective and the efforts to restore normality are persistent and uninterrupted. Slight over-correction is aimed at, and this is maintained by light splinting or strapping (fig. 6) until the child begins to walk. Each case has to be judged on its own merits, but usually in anything more than the very mild types, night splinting should continue during the ensuing year or so. For it must be remembered that in a large number of cases there will be an inevitable tendency for the bones to grow back into the mould in which they were originally cast.

Open operation is seldom necessary. It is mainly indicated for those feet in which fibrosis is severe or in which there is marked initial bony deformity resistant to moulding, or feet which have been neglected and the bones have grown in deformity. Operative re-fashioning of the bones should, if possible, be reserved for older children, and in most of the younger ones division of the fibrotic and contracted soft tissues will suffice (fig. 7).

FIG. 9.—Bilateral hallux varus.

OTHER DEFORMITIES OF THE FOOT

'Postural' calcaneus deformity.—Not infrequently the foot or feet of a newborn infant may be in a position of extreme calcaneus (fig. 8). This is due to intra-uterine compression and moulding. Recovery is speedy, and is easily obtained by simple bandaging. No deforming force is operating and there is no recurrence.

Congenital hallux varus (fig. 9).—It is worth while to attempt correction by moulding and strapping from as early an age as possible, but as a rule

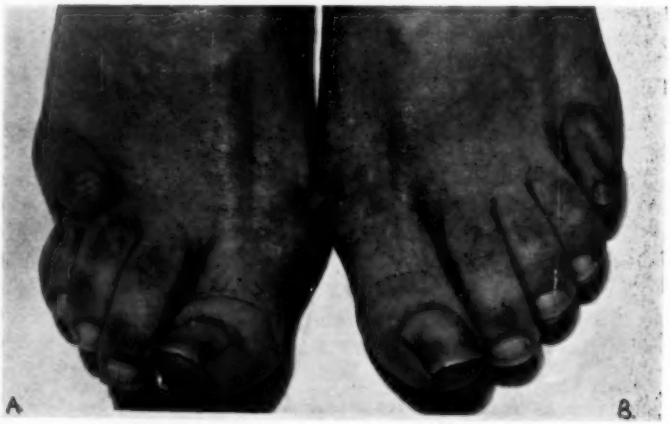


FIG. 10.—Congenital dorsal adduction of the toes: (a) Complete displacement; (b) partial displacement.

operative fixation is ultimately necessary to ensure that the correction will be permanent. On no account should the toe be removed.

Congenital dorsal adduction of the little toe.—Unfortunately conservative treatment by moulding and strapping rarely succeeds in correcting this deformity, which is common and may give rise to a good deal of inconvenience. It is, however, reasonable to attempt correction in this way at a very early age. If the deformity persists, the toe should be allowed to settle into its final position before any operative treatment is carried out. The reason for waiting is that although a partial displacement (fig. 10b) causes trouble, a complete displacement in which the toe comes to lie in the hollow above the fourth metatarso-phalangeal joint is commonly not attended by any inconvenience or discomfort (fig. 10a). Minor procedures like division of the

FIG. 11.—Bilateral syndactylism of the 1st, 2nd and 3rd toes (by permission of Miss I. Forshall).

extensor tendon and capsule are not successful and, on the other hand, removal which was the practice until a few years ago tends to expose the head of the fifth metatarsal to pressure and irritation. I have therefore been creating an artificial syndactylism by joining the fifth to the fourth toe and have found this procedure very satisfactory.

Syndactylism of the toes (fig. 11).—This condition can be ignored. It does not give rise to any disability, and the only occasion when anything need be done is if the fusion of the cleft is proximally incomplete and a pocket of skin exists. This pocket should be excised.

Extra digits (fig. 12).—If we were a barefoot community this abnormality would not matter. But we live in shoes, and within reason our feet must fit them. It is therefore reasonable to reduce the number of digits within normal limits. Usually it is best to remove the peripheral digit or digits, but occasionally these are quite normal, and a more central digit, obviously small or useless or displaced, should be dispensed with.

FIG. 12.—Extra digits of both feet (by permission of Mr. F. C. Dwyer).

CONGENITAL DEFORMITIES OF THE LEG

Absence of all or part of one of the leg bones.—If the whole of the lower limb is missing, no particular problem exists for the doctor or the surgeon. An artificial limb should be fitted as soon as possible. Similarly, if the intrauterine amputation has been cleanly performed through the lower part of a limb there is no problem. It is in children who lack the upper half of the femur or the tibia only, or only the fibula, or a portion of one of these two bones, that thought and ingenuity are called for (fig. 13). No hard and fast procedure can be described. In each case the ultimate benefit of moulding, grafting, fusing and transplanting, separately or combined, must be judged nicely and with a view

FIG. 13.—Congenital absence of part of the femur and the whole of the tibia.

to potential growth in the bones of a child. Interesting changes of attitude have occurred in the last twenty-five years. Originally, the policy was to mould the distorted limb so that a peg leg could be worn during the period of rapid growth and be replaced later by a prosthesis. This phase was followed by a tendency to amputate the comparatively useless distal portion. Amputation was carried out about the time the child began to try to walk, and a prosthesis was then fitted. One suspects the influence of limb fitters in this attitude, because they were undoubtedly very expert in making artificial legs for little children, and the children were very expert in

FIG. 14.—Congenital short right femur.

using them. It was argued that if the child wore an artificial leg practically from the beginning, disability was surprisingly slight. But there has latterly been a swing towards a more constructive attitude. The possibilities of procedures for which the word 'orthoplasty' may be coined are being explored: implantation of a vestigial upper end of tibia into the fibula, or implantation of the lower end of either bone into a tarsus which has been brought into the correct line, may obtain stability, and the use of 'stored' bone for inserting grafts has increased the range of constructive measures. In any event, peripheral portions of a little child's limb should not lightly be discarded. The future adult should be envisaged, and the importance of length

in the stump which has to carry a prosthesis should be remembered.

Bowing of the tibia.—The tibia may be congenitally bowed in one of three directions, either forwards, backwards or outwards. The first two are rare and usually call for operative treatment at the age of about two years. The outward bowing is probably not pathological and operative interference should be deferred for a much longer time, partly because correction may occur naturally, and partly because union may not occur very readily.

Congenitally short femur.—Although uncommon, this is not a rare condition. It is practically never detected until the child has been walking for some time. Even after detection an expectant attitude should be maintained for several years. During this time the shortening is compensated by thickening the heel and sole of the shoe, and careful measurements of the femur should be made (radiologically) in order to determine the rate of growth in the bone, and whether or not the disparity is progressive. In my experience the ultimate difference in length is never sufficient to warrant shortening the other femur. At about the age of ten years it is usually possible to assess what the final difference in length will be, and the affected femur can then, by operation, be lengthened appropriately (fig. 14).

Pseudarthrosis of the tibia.—It now seems certain that this pseudarthrosis is not present at birth, but the defect leading to the non-union, being due to early embryonic influence, is present at birth. The fracture seldom arises before the child begins to walk. It has proved resistant to all forms of treatment except a double onlay graft or a by-pass graft as illustrated (fig. 15). The latter, which should not be carried out before the age of three years, was

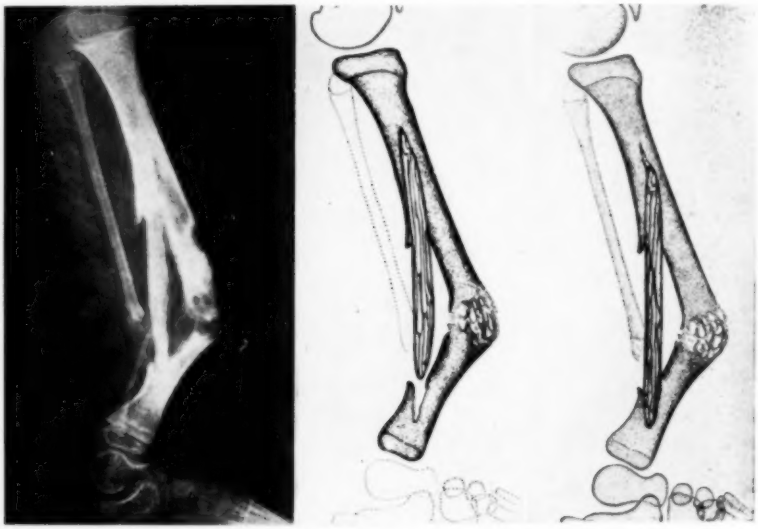


FIG. 15.—X-ray and diagram of 'by-pass' graft for 'congenital' pseudarthrosis of the tibia.

devised in 1936, and possibly because the idea is my own I think it the better of the two methods (fig. 16).

SOME RARE CONGENITAL DEFORMITIES

Arthrogryposis; achondroplasia; osteochondrodystrophy, and *diaphyseal aclasia* are conditions which, although not rare, are hardly common, and they affect

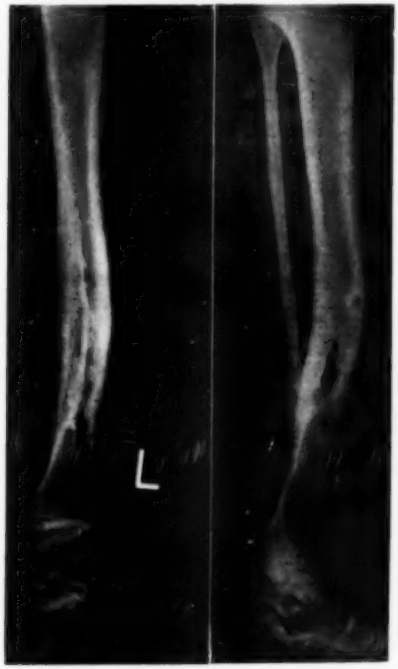


FIG. 16.—X-rays of two patients fourteen years after 'by-pass' grafting for pseudarthrosis which had resisted all other forms of graft.

the lower limb only as part of a general manifestation; whilst congenital *dislocation of the knees* and congenital *coxa vara* are probably so rare as not to merit inclusion in this article.

CONCLUSION

The practitioner will often be asked two questions by the anxious parent or parents of a congenitally deformed child: 'What caused this, doctor?' To this his best answer, in view of the many and conflicting theories, is that the cause is unknown and the defect is best regarded as a stroke of fate. He can assure the parents that 'It is due to no fault on their part'. 'Do you think we should risk another child, doctor?' To this I believe he should answer unhesitatingly 'Yes'. The chances of a second child having the same or a similar defect appear to me to be infinitely less than were the chances of the first child having the defect.

CONGENITAL ABNORMALITIES OF THE SKIN

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CONGENITAL abnormalities of the skin account for an extraordinary variety of lesions, many of which are present at birth, whilst others become manifest in childhood or may even be delayed to adolescence.

XERODERMA AND ICHTHYOSIS

One of the most common conditions in this group is *xeroderma* or dry skin; the more severe type of this anomaly is associated with coarse scaling and is known as *ichthyosis* (fig. 1). The skin is too dry because there has been a defect in the development of the skin appendages so that the sweat and sebaceous glands are scanty. In severe cases, the patient with xeroderma cannot sweat sufficiently to cool the body in a hot climate, and the subject is much distressed by heat and may have to pant and protrude the tongue in the same way as a dog. As the essential defect is anatomical, a cure in the ordinary sense of the term is impossible, but discomfort is alleviated by the application of soft or liquid paraffin which may be diluted with vegetable oil to relieve the greasiness when this is objectionable. The scaly skin of ichthyosis is often dirty and discoloured and it is important to realize that this is not due to neglect. Ichthyosis may be treated with greasy applications, as mentioned above, but when the scaling is thick the addition of 1 or 2 per cent. of salicylic acid to the oily application is often an advantage.

Occasionally, xeroderma is associated with other developmental defects of ectodermal origin: for instance, the hair of the scalp may be absent (congenital alopecia), or it may be scanty, fine and never attain a length of more than one or two centimetres. The teeth may be deficient in number, widely spaced and peg-shaped. In severe cases the buds of the permanent teeth are absent. Coronary, lamellar and axial cataracts have often been recorded in patients with dental defects and the association has recently been reviewed by Spitzer and Mann (1950).

Like the hair, the nails may be absent or too small (micro-onychia), or the nail plate may show some deformity. With many or all of these defects of ectodermal origin mild or severe degrees of mental deficiency may occur. The dental and eye changes alone appear to be most commonly encountered in the idiopathic epileptic or the mongol. The clinical picture thus presented has long been known as *ectodermal defects* and a good account of them was given by Cockayne (1933).

Unfortunately, no treatment can put matters right. It might be noted that short hair on the scalp may be the result of some defect in the hair shaft. Examples are twisted hair (pili torti), the beaded hair (monilethrix) and, less commonly as a congenital anomaly, the hair which breaks in fibrillated nodes (trichorrhexis nodosa).

NÆVI

Birthmarks, or nævi, account for the largest number of congenital abnormalities of the skin. The term nævus should strictly apply to the various types of pigmented mole, which are characterized by the presence in the dermis of nævus cells. However, it is somewhat paradoxical to apply the term birthmark to a lesion which may not be observed until some time after birth, so that it is a common practice to use the term nævus for every type of birthmark.

FIG. 1.— Ichthyosis showing pigmented coarse scaling.

Vascular nævi are produced by an abnormal pattern of blood or lymph vessels. The former, termed hæmangiomas, may be formed of superficial capillary vessels, or larger deep vessels, or a mixture of both. Capillary hæmangiomas include the stellate or *spider nævus*, which consists of a central large arteriole with telangiectatic vessels radiating from it, producing a minute stellate pattern. This is best treated by coagulating the central vessel with a fine galvano-cautery or diathermy needle.

The *capillary nævi* vary in colour from a pale pink through shades of deepening red to the 'port-wine mark', and the prognosis worsens with the depth of colour, the port-wine mark usually resisting every kind of treatment, although the intensity of its colour may be considerably reduced. It is probable that many of the pale birthmarks disappear spontaneously, and no doubt much credit for their successful treatment is claimed when Nature herself has been largely responsible for the improvement.

All these superficial blemishes of the skin may be treated by freezing with

a carbon dioxide snow pencil for 20 to 60 seconds, repeating the application after two or three months, by which time the inflammatory reaction provoked will have entirely subsided. Large irregular areas are more conveniently treated by brushing on a slush made by adding a little acetone to

FIG. 2.—Capillary-cavernous nævus before treatment with X-rays.

FIG. 3.—Capillary-cavernous nævus 16 months later.

the powdered CO_2 snow. Two or three quick applications will freeze the skin and produce a satisfactory reaction. The snow treatment is painful and, for that reason, much use has been made of a radioactive paint containing thorium X (the strength recommended is that containing 1,500 electrostatic units per cubic centimetre of varnish). It is merely necessary thoroughly to cleanse the skin with ether or alcohol and then to paint the varnish over the discoloured area. As the radioactivity of the thorium X chiefly depends upon *alpha* particles which have little power of penetration, the risks of scarring the skin by such treatment are practically negligible. Thorium X may be applied monthly for 20 to 30 paintings and, if a satisfactory response is to be expected, considerable paling should be noted after 12 applications.

Cavernous nævi usually occur as soft swellings of the skin, which may show a bluish tint. Many of these lesions have a red or purple mottling at the most prominent part of the bulge and this indicates the presence of a capillary element, so that the lesion may be referred to as a capillary-cavernous hæmangioma, although it is commonly described as the 'strawberry mark'

(fig. 2, 3). The mixed and cavernous nævi practically always disappear spontaneously in the course of a few years, and such lesions are met with extremely rarely in adults. If this type of birthmark is out of sight, nothing need be done, but it is the custom to treat those on the face and exposed parts of the body with small doses of X-rays, say 200 to 300r, at two- to three-monthly intervals. The flatter lesions respond well to short exposures to half-strength unscreened radium plaques, which provide a convenient source of *beta* rays. Deeper lesions may be injected with thrombosing agents, such as a 10 per cent. solution of sodium chloride, or a few minims of tincture of iodine or of dilute hydrochloric acid. Only a minim or two of the latter two agents should be injected deeply into several parts of the swelling, or necrosis or ulceration is likely to follow. It may be taken as a general rule that if a vascular nævus calls for treatment, the sooner that treatment is applied the more effective it will be.

FIG. 4.—Pigmented hairy mole.

Lymphangiomas may also be capillary, cavernous or mixed, but they are usually seen as a group of bright yellow vesicles on pale bases on the sides of the neck, shoulders or limbs. The lesions may be destroyed by diathermy or, if the whole area of affected skin is small, they might be excised with a better cosmetic result. The treatment of the larger cavernous lesions is also surgical.

Pigmented nævi occur as pale brown macules, or with deeper shades of colour, even approaching jet-black, and the areas may be small or cover considerable parts of the body. Often the brown or dark coloured skin is covered with coarse hair and the affected skin may resemble that of a chimpanzee or gorilla (fig. 4). Excision with plastic surgery is the best treatment for the smaller pigmented moles, but if they are extensive, nothing can be done. A malignant melanoma rarely arises in a widely spread hairy mole, but a small, smooth, darkly pigmented mole is probably best treated by a wide excision within the first two decades, or immediately upon any active growth being observed.

Warty nævi are not uncommon and often occur in linear streaks of small warty papules which may be coloured a greyish shade of brown. Linear

nævi are often unilateral and are thus described as nævus unius lateris (fig. 5). They may be extensive and run the whole length of the limb. The warty nodules may sometimes be flattened by diathermy, but excision is probably the better treatment. Unfortunately, there appears to be an undue tendency to keloid formation in the scar which has, on many occasions, completely spoilt the cosmetic result, and occasionally contraction of the scar has resulted in flexural deformities.

FIG. 5.—Unilateral linear warty nævi.

Some of these hyperkeratotic warty nævi are called *ichthyosis hystrix* and the lesions may appear as broad, thick, horny bands affecting the palms and the soles, or, occasionally, the flexures. Another interesting hyperkeratotic congenital anomaly is *tylosis* or keratosis palmaris et plantaris. In this condition there is a pronounced horniness of the palms and soles which may appear within a few years after birth. In the course of time the hyperkeratosis of the palms and the soles may become very marked and lead to cracking of the skin in the folds. The palms usually have a dull, yellowish appearance on account of the horn, and sometimes the edges, which are usually well circumscribed, may be bright red. Tylosis has the character of a dominant inherited defect, running through several generations and occasionally affecting every child in a family. No treatment is satisfactory but the horny skin may be softened by salicylic acid ointment.

EPIDERMOLYSIS BULLOSA

In *epidermolysis bullosa* trivial injury to the skin is followed by the appearance of a blister (fig. 6). Sometimes the condition is so severe that friction between a baby's fingers produces blisters, rapidly becoming infected sores, and similar lesions are apt to arise at the sites of pressure, such as on the occiput. The most common type of this anomaly appears to be a dominant characteristic, and sometimes an elaborate family tree reveals the affliction through several generations. The recessive type may completely lack this familial evidence, and there is a dystrophic form of the disease in which the blisters are followed by persistent sores sometimes covered with warty

granulations. Lesions of the eye, e.g., essential shrinking of the conjunctiva, may occur and also dystrophic changes in the teeth and nails.

Two infant girls were seen with this disease in a family in which the father, a radiologist, had been exposed to the inevitable radiation hazards of an X-ray department. The first child of this family, a boy, had also suffered from a defect of one half of the bodies of several vertebræ, but these examples of congenital abnormalities associated with exposure to X-rays are the only examples in my experience, and the association may be fortuitous.

FIG. 6.—Epidermolysis bullosa showing ruptured bullæ and white epidermal cysts on the knees.

Epidermolysis bullosa may readily be mistaken for pemphigus neonatorum, which is bullous impetigo of staphylococcal origin affecting the newly born. The appearance of bullæ at the sites of friction or trauma, and showing no tendency to spread elsewhere, usually makes the diagnosis simple. In the Ehlers-Danlos syndrome an elastic skin is usually associated with laxity of ligaments and a fragility of the skin which allows it to tear easily, so that a light fall on a carpet may necessitate the insertion of a dozen stitches.

XERODERMA PIGMENTOSA

Xeroderma pigmentosa is the condition in which the child's skin is intolerant of ultra-violet light. The first exposure to bright sunlight may be followed by an acute actinic dermatitis which persists during the bright weather. After several summers the skin becomes freckled and shows a few pale atrophic macules, which a few years later become associated with telangiectasis and form horny lesions. These are identical with the actinic keratoses, more common in senile skin which has had much exposure to tropical sunlight. In both cases, the keratoses often develop into squamous-celled epitheliomas and, unless these are removed or treated effectively with radium or X-rays, the child is likely to die of the malignant disease. None of these congenital conditions can be cured, so that protective measures are the best line of defence. The skin may be protected from ultra-violet light by the applications of 10 per cent. tannic acid in 50 per cent. spirit, or by dabbing on an opaque lotion, such as calamine lotion. An emollient ointment containing yellow soft paraffin is also effective and is particularly useful on the dry skin. Experience has shown that there is little to be gained by adding either quinine or *para*-aminobenzoic acid to such a base.

SOME OTHER ABNORMALITIES

Small nodules or tumours may arise from the skin and its appendages as congenital abnormalities. Often these are not noted at birth and usually develop about puberty or in the next decade. Small, pale, firm papules may be either *epithelioma adenoides cysticum*, as described by Brooke, or they may be *tricho-epitheliomas*, or *sebocystomas*. All of these small tumours are benign growths and usually their diagnosis depends upon the result of a biopsy. When treatment is required for cosmetic reasons, the smaller lesions may be destroyed by diathermy, and the larger ones excised. Sometimes the small nodules called *leiomyomas* present identical clinical appearances but these small tumours are often somewhat reddish and may be tender or painful, the symptoms varying with climatic conditions. Again, the diagnosis is established by histological examination.

Another condition which is a congenital anomaly involving both the sebaceous glands and the fibrous and nervous tissues of the skin is known as *adenoma sebaceum*. Often a few bright-red minute papules are first noted on the cheeks, particularly near the nose and these may be associated with soft, spongy thickening of the skin, producing small, oval or rounded circumscribed plaques. In some areas of the body these soft fibromatous lesions may be indistinguishable from *neuro-fibromatosis* and the histology may also be similar.

Adenoma sebaceum may escape recognition in early infancy, but towards puberty the appearance of many bright-red minute papules on the sides of the nose and adjacent parts of the cheek makes the diagnosis easy to those who have previously seen an example of the condition. This type was first described by Pringle. It is not uncommon for similar fibrous masses to develop on the meninges or even to invade the cortex of the brain, producing various degrees of mental impairment, excitability or epileptiform fits, and in this event the patient may first see a neurologist and be diagnosed *epiloia* or *tuberselerose*. There is little that can be done for these unfortunate subjects. The small vascular papules may patiently be destroyed with a galvanocautery or diathermy but they have an annoying capacity for reappearance. The larger nodules and tumours may be excised if this is desired for cosmetic reasons, for they are always benign, and often do not produce any symptoms. Before adolescence some children show an eruption of very bright-red spots on the nose which may be mistaken for adenoma sebaceum. However, this condition is a separate entity, known as granulosis rubra nasi, which some authorities regard as a sequel to local hyperhidrosis.

Finally, a few other conditions, which are considered by some to be based upon developmental abnormalities, may be considered. *Urticaria pigmentosa* is an intriguing anomaly, easily recognized when a few cases have been seen, but otherwise presenting considerable difficulty. The eruption may be present at birth or occur shortly afterwards, or be delayed for a few years and, to make its etiology more obscure, cases have been seen arising in

adults. The eruption consists of dull, brownish, circumscribed macules which first arise as a fairly characteristic urticarial lesion, although the usual erythematous colour may be blended with purple or brown tones. The urticarial phase passes and then the brownish stain may persist for many years, but usually disappears before adolescence. Occasionally, nodules or small tumours mark the site of these lesions and the microscope reveals masses of mast cells, so that the lesion may be regarded as a mast cell nævus. No effective treatment has yet been found for this disease.

Xanthomas appear as small, canary-yellow coloured papules scattered over the body or limbs. When these are numerous the condition is often called xanthoma tuberosum and, as the condition usually arises within the first few years of life, many cases may be regarded as congenital abnormalities. It is usual in such cases to examine the blood for hypercholesterolæmia which may be the result of diabetes mellitus or disease of the liver or spleen. The condition as above described is idiopathic and the blood cholesterol is within normal limits. More rarely, an infant may present brownish-red patches on the trunk and these may have a distinctly yellowish tinge suggestive of xanthoma. Such lesions are usually described as *nævo-xantho-endotheliomas*. It would appear that most of them disappear spontaneously after a few years, but if the lesion is small and solitary, it may as well be totally excised for histological examination.

Pseudo-xanthoma elasticum is regarded by many authorities as a congenital abnormality of the skin, although it may well be based upon some inborn metabolic error. These subjects tend to have an elastic skin and, sooner or later, present whitish, or yellowish-white, flat papules on the skin of the abdomen or about the shoulders, or on the upper parts of the limbs and the sides of the neck. Sometimes, the skin lesions are confluent, producing a soft thickening of the integument. A useful diagnostic feature is the presence of angioid streaks in the retina. This disease is thought to be essentially a degenerative process, affecting the collagen, so that although there may be considerable disturbance of the normal histology of the skin, this may be secondary to a congenital metabolic defect.

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BIOPSY IN MALIGNANT DISEASE

By SIR HENEAGE OGILVIE, K.B.E., D.M., M.Ch., F.R.C.S.
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In 1943, when I was consulting surgeon to the Middle East Force, I was asked to see a girl in the middle twenties, a private in the A.T.S., who had been admitted to a hospital in Cairo for the treatment of a lump in the right breast. The lump was about the size of a golf ball, solid, hard, and still movable in the breast substance, but there was an extensive involvement of the surrounding skin, an erysipelatoid cancerous extension that is seldom seen except in young women. I advised deep X-ray therapy, and asked that she should be transferred to the Hadassah Institute in Jerusalem for this treatment.

I saw this girl again five years later at Guy's Hospital where she came for examination in July, 1948. She now had extensive involvement of the axilla and the whole chest wall. She died in September. On my return from South Africa in December of that year I found a letter from her sister, from which I quote two sentences:—

> 'What has amazed the leading specialists and doctors, both in India and in England, is why a biopsy was never performed, especially as the young girl was of a very strong constitution and could easily have stood an amputation of the breast. Even if you did not think an amputation was the correct thing to perform, surely you, as one of the leading surgeons in the Middle East, should have performed a biopsy, which is the recognized thing to do in cases of suspected cancer'.

This is a letter that any woman might write at a time of bereavement. It is typical of those that most surgeons receive from time to time. I quote it because it raises three important questions that must be discussed.

SURGERY OR RADIOTHERAPY?

First, the writer assumes, and has apparently been told by 'leading specialists', that the correct treatment of breast cancer is by a radical amputation.

The simplest classification of cancer on clinical grounds for record purposes is into three stages. In Stage I there is a primary tumour only: it may be large or small, but there are no malignant cells outside its visible and palpable limits. In Stage II, in addition to the primary tumour, there are malignant cells in the nearest lymph glands, but these glands are freely movable, and neither the primary tumour nor the glands are adherent to the structures that surround them. In Stage III the primary growth or the glands are adherent to, or have invaded, the surrounding structures, or glands beyond those in the first catchment area are involved, or there has been extension through the blood stream or by the serous cavities. Many writers use a classification involving four or more stages, but the difference is that they divide Stage III, the inoperable stage, into several degrees.

At the present time two methods of treatment alone hold out the hope of curing cancer—radical surgery and radiotherapy. With the exception of the temporary alleviation that may be obtained in cancer of the prostate by the use of stilbœstrol, and in some late cases of cancer of the breast with stilbœstrol or testosterone, all forms of chemotherapy have proved useless, or at any rate disappointing. A radical operation is planned to remove in one block the primary tumour, as much of the organ or tissue in which it arises as may conceivably have been involved by direct extension, the lymphatic channels draining the part and the structures they traverse, and the whole group of lymphatic glands into which they empty. Radiotherapy acts by killing the cancer and its extensions where they lie, without killing or seriously damaging the normal tissues that surround them. An operation has the unique advantage that all malignant tissue included within the operation area is removed from the body; when therefore it removes a block of tissue that includes the growth and all its extensions, it can guarantee cure with a certainty that no other method can approach. It has two disadvantages: that it involves removal of a whole segment of the body, normal tissues with abnormal, and that if it fails to include all cancer within its scope and passes at any point through malignant tissue it does not cure, and may even disseminate cancer cells to areas they would not otherwise have reached. Radiotherapy has the advantages that its scope has few anatomical limits and that it does not require an anæsthetic, an incision, or the removal of any part of the body: it has the disadvantages that it produces scars that may be more unsightly and are often more painful than those of operation, and that if it leaves even a few surviving malignant cells in the irradiated area it has failed. On the other hand, when it fails to cure, radiation nearly always relieves suffering and prolongs life.

The application of these basic principles to the treatment of cancer of the breast is complicated by the observation that the division of patients into three pathological stages by clinical examination is fallacious. In *Stage I* a radical operation will cure 100 per cent. of cases. This is not a claim but a statement of nursery mathematics, for in Stage I there are no malignant cells outside the tumour; the tumour is in the bucket, and tumours in a bucket never recur. Radiotherapy may cure a proportion, but a tumour that has been irradiated is not removed from all possibility of recurrence with the same certainty as one that has been removed spatially. Both these statements refer to Stage I in the pathological sense. In practice, however, malignant glands cannot always be found, even by the most careful examination.

The figures published by the British Empire Cancer Campaign record that of 100 cases placed in Stage I on clinical grounds, 40 were shown on microscopic examination of the removed specimen to have glandular involvement. Richard Sampson Handley has shown that in 50 consecutive cases in which he explored the anterior intercostal glands, in 3 these glands contained cancer cells, although none of the axillary glands was involved.

In practice the five-year cure rate by operation in Stage I is from 80 to 85 per cent. These figures have been obtained by Gordon Taylor, Stanford Cade, and by the group of Leeds surgeons whose results were investigated by the Ministry of Health

in 1932. The five-year cure rate by radiotherapy alone in Stage I is about 60 per cent. Truscott gives the figure of 57 per cent. The Christie Irstitute, Manchester, gives 56 per cent. McWhirter claims 76 per cent., but many of his cases have been observed no more than three years, a period to which even cases entirely untreated would be expected to survive.

In *Stage III*, that in which this girl was when first seen, operation can never cure, and is likely to do more harm than good. Such disasters as shot-gun scatter to the cervical glands, rapid extension through an intercostal space to the thorax, wide dissemination in the flaps of the incision, or early involvement of the dorsal vertebræ may follow injudicious surgery on patients in whom the skin incision or the axillary dissection passes through tissues infiltered with cancer cells. Radiotherapy, on the other hand, is certain to alleviate symptoms and prolong life, it will often dispel for a time all visible and palpable evidences of cancer, and may occasionally effect a cure.

In *Stage II* we have the most difficult decisions, for this stage, including as it does everything between Stage I and Stage III, will include cases with a very varying prognosis when the classification is made on clinical grounds. At one extreme will be those in which one doubtful gland is palpable and which many would include in Stage I, at the other those cases placed by an optimist in Stage II which prove at operation to be well into Stage III. The indications for operation remain the same. Operation can cure those cases in which it is able to remove all malignant tissue, but once Stage I has been passed, once cancer cells have left the parent tumour, it is impossible to say on clinical or even on microscopical grounds how far they have gone. We can only infer their presence by sight and touch, methods of examination that cannot detect the earliest changes. The decision is therefore a matter of judgment rather than of principle, of placing a case in early Stage II or late Stage II, rather than of deciding between Stages I, II and III, of deciding whether operation is an investment or a gamble. An indication of the results to be expected in early Stage II may be obtained from the figures of the British Empire Cancer Campaign referred to above.

If the cure rate in pathological Stage I is 100 per cent., if the cure rate in clinical Stage I is 85 per cent.; and if only 60 per cent. of clinical Stage I are pathological Stage I and the remainder are pathological Stage II, then the cure rate by operation in early Stage II is

$$\frac{85 - 60}{100 - 60} = \frac{15}{40} = 37.5 \text{ per cent.}$$

The published figures for five-year cures in Stage II are much the same: 40 per cent. in Gordon Taylor's figures, 38 per cent. in Truscott's figures, 29 per cent. in the M.o.H. figures. It must be remembered, however, that clinical Stage II will inevitably include a number of pathological Stage III in which the cancer cells are already beyond the lymphatic outfield at the time of operation.

The advice we are bound to give at the present time, one with which the great majority of experienced surgeons would concur, is therefore this: In Stage I a radical operation offers the best chance of cure. The cure rate will vary from 80 to 100 per cent., according to the accuracy with which the stage of the case has been assessed. In Stage II a radical operation is the right

treatment for those cases in which the only evidence of extension is one or two small, freely movable and peripherally placed glands. It may be advised, after preliminary radiotherapy, in cases with larger or more numerous glands. It should be avoided when there is any possibility that glandular extension has reached the costo-coracoid membrane.

THE QUESTION OF BIOPSY

Secondly, the writer of the letter has been informed by the same leading specialists that biopsy 'is the recognized thing to do in cases of suspected cancer'. I would set my experience against these leading specialists and say that in my opinion biopsy is often a device for postponing decision and shelving responsibility, a refuge for the incompetent and a moral support for the timid; it is an added danger to the patient and seldom necessary to the surgeon who knows his job. In this particular instance biopsy would have been foolish, for the diagnosis was painfully obvious. Were biopsy to be made a penal offence, very few people would suffer, and countless lives would be saved. These are assertions; here are my reasons:—

Biopsy is defined in the dictionary as 'the removal of a piece of tissue from the living body for diagnostic purposes'. Let me say at once that there can be no objection to the removal of a piece of tissue to settle the diagnosis in some non-malignant condition, nor to the excision of the whole of a possibly malignant lump with the zone of apparently normal tissue round it for histological examination, particularly if the diagnosis is made immediately by examining a frozen section of the specimen, and the radical operation is proceeded with should the lump prove to be malignant. It is difficult to understand why the use of frozen sections has been neglected and even opposed for so long by British pathologists. The method has been in routine use in every American centre for more than twenty years, and no surgeon who has seen the use to which it is put in that country, or who has been fortunate enough to work with a pathologist skilled in the technique, would have the temerity to operate on a doubtful breast without having such assistance available. There is also no danger in the removal of pieces of a malignant tumour if the tumour and its surroundings are cut off by a tourniquet from all communication with the body, if the excised specimen is reported on immediately, and if the amputation, should malignancy be confirmed, is performed centrally to the tourniquet without loosening it. The all too prevalent habit of snipping pieces off the edge of ulcers in the mouth, nodules on the face, or tumours in the rectum is, however, deplorable.

A cancer passes from Stage I to Stages II and III by the dissemination of its cells through the lymph and the blood stream. When, why, and how these cells are cast free is a matter of conjecture, but it cannot be denied that trauma may hasten or determine their detachment. Professor Young of Aberdeen believes that the essential factor responsible for the dissemination of any malignant tumour is a high tissue pressure, and he would like to ban aspiration or punch biopsy for that reason, although he does not believe that

incision biopsy has been proved to be dangerous. Yet the grip of the forceps and the pressure of the knife before it cuts set up tissue pressure, and the cut surface, if the section has been correctly sited, has on it loose cancer cells, some of which may get into the open veins and lymphatics that have been exposed by the same cut. No surgeon would cut into tissues with a knife contaminated with streptococci or spirochætes. No surgeon will keep the instrument he has used to cut into a malignant tumour for the rest of the operation. Yet the same men claim that biopsy is harmless, and quote in support of their claim parallel series, with and without biopsy, in which the survival rate is the same. Such claims based on such figures mean less than nothing, for few things are more fallacious than the 'comparable' series. It is easy to prove that blood transfusion is a useless and dangerous procedure, because the death rate in a series of a thousand wounded soldiers who have been transfused is 6.7 times as high as the death rate in another thousand wounded in the same action, treated at the same hospital, but not transfused. The fallacy here is that the transfused group contained all the serious casualties, and the non-transfused group all the lightly wounded. In any cancer series the group without biopsy will include all the late, large, obvious and inoperable cases; the biopsy group will contain all the early and doubtful cases. Many of these last will be cured, but if any die of biopsy-induced recurrence who might otherwise have survived, the method stands condemned. Who shall say that it is blameless? Who shall say that the few cells in the glands that have reduced the chances of cure from 80 to 30 per cent., or those the entry of which into the blood stream have made the outlook hopeless, were not sent there by that well-meaning stroke with the knife? A large ulcer in the mouth is either a cancer or it is not, and the surgeon who does not know should refer the case to a surgeon who does. A small ulcer in the mouth or on the face may be puzzling; in which case it may be excised but not incised for section. A tumour in the rectum is a carcinoma in the overwhelming majority, and the occasional possibility of an amœboma can be settled more easily by a course of emetine than by biopsy, without the risk of unleashing cells on their malignant mission.

THE SURGEON'S RESPONSIBILITY

Thirdly, the letter was clearly prompted by the decision in the *Whiteford v. Hunter* case, a decision that was reversed later in the Court of Appeal.

At two operations in March and April 1948, Mr. Hunter felt an indurated area at the base of the bladder which he believed to be malignant, and he informed the patient of his opinion. The induration was later found to be due to an infected diverticulum, and Mr. Whiteford sued Mr. Hunter for having made a negligent diagnosis. It was claimed for the plaintiff that a cystoscopy should have been performed at some time in the course of the case, and that a biopsy should have been done before the diagnosis of cancer was made. The medical evidence for Hunter unfortunately did not make it clear that a surgeon who has looked at a tumour with his eyes and felt it with his hands can gain no further information by peering at portions of its surface, artificially illuminated, across a stratum of liquid through a system of prisms and lenses, or that biopsy can at times be useless and dangerous. Mr. Whiteford was awarded £6,300 damages.

It is possibly an error of judgment on the part of a surgeon, to say to a patient 'you have cancer' rather than 'I am sure you have cancer', but patients usually prefer the honest opinion of an expert stated bluntly, to a carefully phrased assessment so hedged about with qualifications that it cannot be proved wrong by any possible future development. They prefer to hear 'yes' and 'no' to 'taking all circumstances into consideration I am inclined to agree with you', or 'bearing in mind the information that is at present available the answer is in the negative'. To have done a biopsy in the lesion described in the evidence in this case would have been bad surgery and probably useless. There was an indefinite indurated area round the base of the bladder; where should the section have been taken? If a portion was removed from near the edge it would almost certainly have shown a non-specific inflammatory reaction, whether there was a cancer more centrally or not; if taken from the centre it would probably have consisted of necrotic tissue on which no opinion could be based; if large enough to include all portions it would allow escape of urine and bacteria into the perivesical tissues, and, were the induration due to cancer, it would finally remove any hope of cure that might remain. Had Hunter done a biopsy merely to bolster up his opinion he would have shown himself to be unworthy of the leading place he holds in British surgery today.

But I am concerned now not with the rightness or wrongness of Hunter's actions or with the wisdom or otherwise of the legal decision, but with the dangerous influence that any such expression of opinion may have on surgical teaching and practice. Already local anæsthetic needles broken in the pterygoid fossa are often removed, however little harm they may be doing and however much harm the operation for their removal may do, because the dentist will otherwise be at the mercy of any litigious friend whom the patient may meet at a cocktail party. Already fractures are manipulated and re-manipulated, not until the best functional position has been obtained, but until an X-ray that can safely be shown to a jury can be produced. Were it to be accepted that a diagnosis of malignancy must not be made without biopsy, the absurd and dangerous position would arise in which a surgeon in charge of a patient suffering from cancer must choose between what is scientific and what is sanctified, between scattering cancer cells throughout his patient's body and signing his death warrant, and facing the risk of blackmail, professional ruin and financial disaster. I believe that in malignant disease biopsy is always dangerous and seldom necessary. In this I am in disagreement with many of my colleagues, but I hold the opinion honestly, after much thought and frequent discussion with experts, and on the basis of long experience. The public must be protected against negligence, but if they are encouraged to demand in their treatment a standard of orthodoxy laid down by case law, the progress of surgery will be at an end.

PATHOLOGICAL SLEEP

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A HYPOTHESIS which will be adequate to the task of explaining the phenomenon of sleep has, so far, not yet been propounded. Freud (1914) held out the theory of a rhythmic return to intra-uterine Nirvana; Pavlov (1927) spoke of internal inhibition; von Economo (1944) assumed that sleep supervenes upon a lack of incoming stimuli; the supposition of chemical substances of a catabolic kind, or of endocrine substances, circulating in the cerebrospinal fluid is a well known one; and, more recently, a great deal of research work has been carried out with a view to discovering both the existence of a sleep centre and the mechanism of its activation. Clinico-pathological studies, however, have failed to reach unanimity as to the location of such a centre, and it would seem that a much more extensive sleep area than, say, the hypothalamus will have to be posited. One of the most illuminating additions to knowledge of this subject concerns the question of wakefulness. When we consider that during the 1939-45 war millions of people in London were subjected day and night to the wailing of sirens, with its almost continuous induction of wakefulness, and that no statistically observable increase in mental or physical illness was recorded, it becomes necessary to restate our opinions on the question of 'not sleeping'.

The probability is that more than one hypothesis is needed in order to meet all the requirements of a satisfactory explanation. Where rhythm is concerned it may be supposed that all living protoplasm will go to sleep when fatigue (possibly a chemical product) sets in, and that some order is brought into this haphazard activity-fatigue-sleep periodicity by the necessities inherent in civilized society and based in the main on the more fundamental periodicity of day and night. The negative side of sleep is a turning away of body and mind from the otherwise endless interests of the day. But we do not stop thinking; our autonomic system does not stop working; even our pyramidal and extrapyramidal systems remain, in a measure, active. So that the positive aspect would be a retirement into a sphere of interests which our daily work prevents us entering into. To be sure, this sphere also has its vexations and mortifications, but it is more easily drifted in and out of, and it is not subject to the restrictions and impositions of the herd.

HYPOSOMNIA AND INSOMNIA

Few psychiatrists would disagree that nine out of every ten psychopathological cases complain of insomnia. And since during their waking hours they are unable to concentrate upon anything at all, the reason which they give being that their thoughts wander, it is not too much to assume that the same state of affairs exists when they try to go to sleep. The term insomnia is

one that is much abused both by the laity and the profession, and often it means no more than the expression of a purely subjective feeling on the part of the patient. It is certainly remarkable how people who 'never close their eyes' manage to escape the dire results which they suppose are bound to follow this perpetual sleepless state. Lack of habit formation is here often the main cause. In other instances, the individual who does not usually complain of lack of sleep is probably one who does not need the average quantity. In others, again, there is preoccupation with the day's unfinished and unsatisfactory activities; and to this class belong quite a number whose daily work is non-productive, or non-satisfying, or beyond their capabilities, or consists of merely a superficial social round. The most genuine types of insomnia, apart from those who are in pain or who are having to face a reality crisis, are to be found among the manic-depressives, the anxiety states, and the obsessional states. The most important rule to observe in all cases of insomnia is always to look upon it as a part of a complex of symptoms, never as an isolated element; nor should it ever be accepted at its face value. And these rules must direct treatment.

On the whole it is, perhaps, more accurate to speak of hyposomnia rather than insomnia, since all but the worst psychotics obtain a certain amount of sleep. This is an aspect which should always be put before the patient, as the average human being labours under the misapprehension that he must sleep the night through, and not less than eight hours. Under this heading may also be mentioned those patients who have great difficulty in 'dropping off', as well as those who wake up much too early. In both instances the subjective sense of having slept insufficiently may remain with the patient throughout the morning. I would emphasize that experience covering many years has led me to conclude that the majority of sufferers from ineffectual sleep fall into two categories: those who, constitutionally, do not need much, and those who are the victims of psychic conflict. It should be an axiom in the management of every case that a thorough physical examination be carried out before resorting to either drugs or psychotherapy.

PERIODIC SOMNOLENCE

From time to time cases are met with which might be termed 'periodic somnolence'. This must not be confused with the pathological state usually referred to as hypersomnia and which has certain distinctive features. Periodic somnolence is distinguished by its periodicity, its chronicity, the absence of any neurological pathology of the central nervous system, and its similarity with ordinary sleep as to general qualities. One such case came under my observation recently.

She was a woman of thirty-five who, since the age of twelve and with great regularity, would retire to bed and sleep for fifteen to twenty hours a day, over a period of some three weeks. Her sleep was in every respect normal and she could be roused from it with little difficulty for meal times. At the end of the period of somnolence she was left with feelings of unreality and with all her sensory faculties greatly heightened. I have no doubt that these episodes were of the nature of fugues and that the emotional colouring was one of depression. Of the existence of true and

prolonged sleep, however, there was no shadow of doubt. During her latest attack she was placed on graduated doses of 'methedrine', up to a maximum of 20 mg., in the morning only. On this treatment her somnolence became greatly diminished, the total period of the episode was reduced to twelve days, and no feelings of unreality followed.

HYPERSOMNIA

Hypersomnia, on the other hand, is a state from which the patient can be roused, but with great difficulty, although the general qualities of normal sleep are demonstrable—attributes which distinguish the condition from coma. It is seen in the early stages of encephalitis lethargica, and also, typically, with increased intracranial pressure, e.g. tumours and vascular lesions. The anatomical incidence of the pressure is in the neighbourhood of the hypothalamus, the third ventricle, the thalamus, or the upper part of the midbrain.

NARCOLEPSY AND CATAPLEXY

A much less rare condition is that known as *narcolepsy*. Here the patient is quite suddenly seized with an uncontrollable desire to go to sleep; he becomes unconscious, although he can be roused, and his sleep lasts from a few minutes to several hours. Sometimes associated with it is the condition known as *cataplexy*, in which the patient loses, suddenly, all control over movement and posture; he falls down, but does not lose consciousness.

An interesting case of narcolepsy was that of a man aged forty-five who had suffered from attacks since the age of eight. His father, his paternal uncle, and his sister were diabetics; a maternal uncle was a narcoleptic, and so was another sister; his mother exhibited bouts of hysteria; there were three enuretics in the family. The patient was a highly intelligent and successful business man, but showed many unreasonable fears, among which a fear of all doctors and all drugs figured largely. Because his narcoleptic attacks were interfering with the discharge of his recently increased responsibilities he had, at long last, been persuaded to seek treatment. The administration of amphetamine (in the form of 'methedrine') has brought about a striking improvement.

OTHER SLEEP DISTURBANCES

Complaint is sometimes made by a patient that he experiences terrifying visions, always when in the half-way state between sleeping and waking. These are known as *hypnagogic hallucinations*. Not infrequently such a patient is also a narcoleptic.

An elderly man complained of seeing his daughter standing over him in a threatening posture, 'as if she was going to murder me'. One morning his hallucination coincided with his daughter's presence in the bedroom; he jumped out of bed, flung himself upon her and proceeded to strangle her. Fortunately, he awoke to full realization before any damage was done. As always happens, on awaking the patient at once distinguishes hallucination from reality.

Whilst cataplectic attacks usually follow some emotional upheaval, such as a burst of laughing, the condition known as *sleep paralysis* occurs, like the sensory disturbance referred to as hypnagogic hallucinations, during the half-way state between sleeping and waking. The patient lies limp in bed and cannot move, although he is quite aware of his surroundings, and may

show signs of intense apprehension. He can, however, be roused from his paresis by gentle manual persuasion.

Lastly, there is the sleep disturbance called *somnambulism*, in which the subject carries out automatic walking and movements during a state of semi-somnolence, and of which he remembers nothing the next day. It constitutes a type of dissociation and is nearly always related to some psychopathological condition, such as a psychic conflict with its attendant anxiety.

TREATMENT

The management of a case of sleep abnormality should follow certain well-defined lines. Most of these patients may be said to suffer more from psychic than from somatic troubles, and a psychological history or investigation therefore becomes imperative. Equally imperative is a full physical examination, which should include a neurological assessment and a blood sugar assay. Having excluded a somatic substratum one is in a strong position to allay pessimism in the patient by truthful explanation and convincing persuasion. Analysis, whether superficial or deep, is best left to a psychiatrist experienced in this form of therapy. Insomnia of the psychotic type must be treated in hospitals equipped for that purpose. Depressives, potential suicides, and schizophrenics belong to this category. Best treated away from home, too, are the more serious grades of anxiety states and obsessional neurosis.

Drugs are very much a matter of individual predilection. 'Medinal', 10 grains (0.65 g.) at bedtime, may be sufficient for restless insomnia. Paraldehyde, 180 minims (11 ml.) in lemon water, acts quickly, but its effects do not last the night out, and often it is necessary to add 3 grains (0.2 g.) of sodium amytal, or 5 grains (0.32 g.) of barbitone. One of these three drugs may be all that is needed, but on the whole it is best to make sure of the patient's sleep—and of his confidence—by a combination of two drugs. Tailing off must be left to the good judgment of the attending physician.

Somnolence and narcolepsy can now be controlled to a highly satisfying degree by the amphetamine group of drugs, e.g. 'benzedrine', 'dexedrine', 'methedrine', and others. These are best administered daily between 8 a.m. and 12 noon. If given later in the day they may, and usually do, disturb night sleep. In all cases they should be given in graduated doses over a period of eight to ten days, when the full dose may be maintained. Apprehension, excitement, palpitation, and insomnia are indications for a reduction or even a complete withholding of the drug.

Somnambulism, hypnagogic hallucinations, and sleep paralysis should always be given the benefit of psychotherapy; and so should *pavor nocturnus*, or night terrors; also all cases of sleep disturbance, whether or not the psychotherapy be combined with drugs.

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PRESCRIPTIONS IN POETRY

JOHN ARMSTRONG, M.D., 1709-79

By BRIAN HILL

Sir Edmund Gosse, the literary critic, once observed that it would be a mistake to imagine that a medical man immersed in thought was engaged in considering either his patients or his prescriptions; more probably he was meditating on the rhymes for a sonnet.

This remark may have been caused by the fact that a doctor, Robert Bridges, had achieved the Poet Laureatship, or Gosse may have been thinking of the many medical men who have been versifiers in their spare time. Indeed, had he confined himself to one century alone, the eighteenth, he could easily have produced enough examples to support his theory. Oliver Goldsmith's medical qualifications perhaps existed only in that author's fertile imagination. But there was Sir Richard Blackmore, physician to the King, whom Pope neatly pinned down among the specimens in 'The Dunciad':—

> 'All hail him Victor in both Gifts of Song,
> Who sings so loudly, and who sings so long'.

There was Mark Akenside, M.D., too, author of 'The Pleasures of the Imagination', a poem acclaimed in its own day if rarely read in ours. There was Erasmus Darwin, grandfather of Charles, and a poet whose Muse devoted herself to botanical subjects. And there was John Armstrong, M.D., remembered at least by collectors of literary curiosities for his epic poem 'The Art of Preserving Health'. Those who like something out of the ordinary in verse cannot afford to overlook this medico-poet, who made a gallant attempt to combine blank verse with physiology, and poetry with prescriptions.

John Armstrong was born in 1709, at Castleton in Roxburghshire. He was a son of the manse. He studied medicine at Edinburgh University, taking his degree in 1732, when the thesis he submitted for his Doctorate —written in Latin as was the custom—was entitled '*De Tabe Purulente*'. He published it later with a dedication to Sir Hans Sloane, the eminent physician.

When the young Doctor moved southwards is not known. He was certainly in London in 1737, trying to further his medical career by the publication of a treatise on the history and cure of venereal diseases. About the same time he aimed at a wider public with a poem entitled 'The Economy of Love'. This work was apparently modelled on Ovid and overstepped the bounds of propriety to a degree which shocked its readers. The author of the article on Armstrong in the Dictionary of National Biography says of it, 'a more nauseous piece of work could not easily be found', whilst another

John Armstrong, M.D.
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writer comments that 'it has been very properly excluded from every collection of poetry'.

AN EPIC ON HEALTH

'The Economy of Love' was merely a *succès de scandale*. There was no doubt about the general and gratifying acclamation which greeted Armstrong's 'Art of Preserving Health' in 1744. Contemporary critics found many passages of genuine poetry in this didactic blank-verse epic, one going so far as to assert that 'to describe so difficult a thing gracefully and poetically, as the effects of distemper on the human body, was reserved for Dr. Armstrong'.

Tastes change. Today, although the reader may agree with many of Armstrong's medical recommendations, the emotion that a perusal of the four books of 'The Art of Preserving Health' is likely to excite is more probably that of amusement than of poetic feeling. Here, for example, are the doctor's recommendations to house-hunters:—

> 'wheresoe'er you build,
> Whether on sun-burnt Epsom; or the plains
> Wash'd by the silent Lea; in Chelsea low
> Or high Blackheath with wintry winds assail'd,
> Dry be your house; but airy more than warm.
> Else every breath of ruder wind will strike
> Your tender body through with rapid pains;
> Fierce coughs will teaze you, hoarseness bind your voice,
> Or moist gravedo load your aching brows'.

Even more curious are the author's attempts to describe in Miltonic verse the workings of the human digestive system. Few poets' eyes, however frenziedly rolling, would care to linger on such lines as these:—

> 'The languid stomach curses even the pure
> Delicious fat, and all the race of oil;
> For more the oily aliments relax
> Its feeble tone; and with the eager lymph
> (Fond to incorporate with all it meets)
> Coyly they mix, and shun with slippery wiles
> The woo'd embrace. Th' irresoluble oil,
> So gentle late and blandishing, in floods
> Of rancid bile o'er flows: what tumults hence,
> What horrors rise, were nauseous to relate'.

Armstrong produces equally absurd results when he turns to the description of homely objects in the lofty 'poetic' language he evidently thought essential to his theme. An egg, for instance, becomes 'the generous nutriment, which, in the shell, the sleeping embryo rears', and a cold bath is transformed into a 'gelid cistern'. Incidentally, Armstrong was ahead of his age in his endorsement of cleanliness as an aid to health. The Age of Reason was not an age of universal cleanliness. Armstrong, however, advocates a daily wash, if not a daily bath, in warm water:—

> 'just enough to clear
> The sluices of the skin, enough to keep
> The body sacred from indecent soil.
> Still to be pure, ev'n did it not conduce
> (As much it does) to health, were greatly worth
> Your daily pains'.

ARMY PHYSICIAN

In 1746, Armstrong was appointed one of the physicians to 'the hospital for lame and sick soldiers behind Buckingham-house'. (He had earlier unsuccessfully applied for an appointment with the forces ordered to the West Indies.) He continued, however, to carry on his double practice of medicine and verse and produced long poems on taste and benevolence. In 1758, too, he published, under the pseudonym of 'Lancelot Temple', a collection of essays on various subjects. These, however, did not please the critics, who found them 'deformed by a perpetual flow of affectation, a struggle to say smart things, and above all a most disgusting repetition of vulgar oaths and exclamations'.

This harsh criticism hardly seems deserved. Armstrong's essays read pleasantly today and do not strike one as affected or 'smart'. Indeed, some of his maxims have an oddly modern application. 'There are readers [he says] so absurd as to admire an author the more for every now and then plunging into the unintelligible'. Whilst of the proverb, '*vox populi, vox dei*', he protests, 'What? The cry of the stupid, ignorant, profane populace who constitute the great majority of mankind, the voice of God! Heaven preserve us!'

That the doctor, although an essentially kindly man, had a somewhat irascible nature is shown by his quarrels with his contemporaries. For a long time he was friendly with John Wilkes, the famous demagogue, but fell out with him over something Wilkes wrote in his journal, *The North Britain:* 'I cannot with honour or decency [remonstrated Armstrong] associate myself with one who has distinguished himself by abusing my country'.

AN UNFORTUNATE VOYAGE

Armstrong's quarrel with Fuseli, the painter, was on more ludicrous grounds. The two men met in Germany in 1763, when the doctor was acting as a physician to the army there. When the Seven Years' War ended

in the same year, Armstrong retired on half-pay and was followed to England by Fuseli. Later, the two friends undertook a trip by sea to Italy. But alas! the protracted and monotonous voyage stretched their friendship to breaking point. When the ship put in at Leghorn they were not on speaking terms. The actual cause of the quarrel was a dispute over the correct pronunciation of an English word, and it is little wonder that Armstrong was enraged. For Fuseli argued that he, a Swiss by birth, had as much right as a Scotsman to judge of the proper pronunciation of English!

OBITER DICTA

Armstrong found the art of preserving his own health for the allotted span. He died in London in 1779, in the seventy-first year of his age. He had never married. To the surprise of his acquaintances he left no less than £3000, saved out of a very modest income, for he had few resources beyond his half-pay from the Army. In his last published work, his 'Medical Essays', he had spoken of himself as a poor man and had attributed his comparative lack of success in the medical profession to the fact that he 'could neither tell a heap of lies in his own praise wherever he went; nor intrigue with nurses; nor associate, much less assimilate, with the various kinds of pert, insipid, lively, stupid, well-bred, impertinent, good-humoured, malicious, obliging, deceitful, waspy, drivelling gossips; nor enter into juntos with people who were not to his liking'.

This example of spleen—that universal eighteenth-century complaint—was evidence of what was only a surface characteristic. Behind his caustic sayings Armstrong concealed a real kindliness of spirit, according to those who knew him best.

'He always appeared to me [said a fellow-doctor] a man of learning and genius, of considerable abilities in his profession, of great benevolence and goodness of heart, fond of associating with men of parts and genius, but indolent and inactive, and therefore totally unqualified to employ the means that usually lead to medical employment, or to elbow his way through a crowd of competitors'.

CURRENT THERAPEUTICS

XLI.—SKIN DISINFECTION

By JOHN R. SQUIRE, M.D., F.R.C.P.

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IT may well be foolhardy to join the many voices which have been debating the desiderata of skin disinfectants ever since the great Lord Lister himself made the subject a live issue. Nevertheless, the practical man trying to carry out his work in accordance with the principles of aseptic and antiseptic surgery (the two cannot be divorced) is always anxious to be given some clear guidance on what he should use. Equally, if a single substance is inadequate for all occasions, when should another be chosen? And is it really necessary to be familiar with the properties of all the new antiseptics which the chemist ingeniously devises and which are recommended as being outstanding, at least in the advertisement columns of our journals?

BACTERIA TO BE FOUND ON THE SKIN SURFACE

If skin has recently been contaminated, almost any pathogen can be recovered by swabbing the skin surface. The hands of a nurse or doctor which have touched the dressings from an infected wound, for example, may carry myriads of β-hæmolytic streptococci (i.e. *Streptococcus pyogenes* if they belong to the highly pathogenic Lancefield Group A) and of coagulase-positive staphylococci (i.e. *Staphylococcus aureus*). Contact, direct or indirect, with other infected wounds, or even with normal fæcal material, may load the skin with gram-negative pathogens such as *Pseudomonas pyocyanea* ('Pyo' for short), *Proteus vulgaris*, or certain strains of *Escherichia coli*. The potentially dangerous spores of the anaerobes, especially of *Clostridium tetani* and *welchii*, although technically more difficult to demonstrate on skin, may certainly reach it from soil and other sources. These well-known facts are recapitulated to emphasize the wide range of bacterial species with which skin disinfection may have to contend. And this list is certainly incomplete, no reference having been made to fungi—or indeed to the viruses, until now so little studied on the skin. And yet, considering the scope of the (bacteriologically speaking) evil tasks which the devil and the necessities of daily life find for human hands to do, remarkably few pathogenic organisms are normally present on the skin. If coagulase-negative staphylococci are neglected as rarely pathogenic, the hands of a hundred consecutive volunteers can be examined with great care, and only one species of pathogen recovered—*Staph. aureus*. This organism is found on up to 20 per cent. of normal hands, at least in small numbers; all the other pathogens are notable by their absence.

The situation is very different on the skin close to almost any sort of skin lesion which is deep enough to exude even traces of serum (Squire *et al.*, 1950). Then *Staph. aureus* is usually found in large numbers and, on appreciable numbers of occasions, *Strep. pyogenes* also will be found. Even clean-looking lesions, well scabbed over, may be responsible for this dissemination; cracks of naso-labial junctions and behind the pinnæ are notorious on the same grounds. 'Pyo' and *Proteus* may be densely transferred from septic lesions such as a running ear; they may also be found in moist regions such as the axilla and perineum. Briefly, self-contamination is constantly occurring, although the normal dry skin evidently has considerable powers of self-disinfection which ought to be taken into account. *Staph. aureus* stands out especially as a common colonizer of the hairy skin inside the nostrils, from which it is often transferred, at least to the skin of the hands and of the face.

NATURE OF THE SKIN SURFACE AND SELF-DISINFECTION

The structure of the skin is familiar enough from paraffin-embedded sections: the regular irregularity of its surface is protected by a continuous sheet of dead keratinous tissue and is pierced only by the openings of sweat and sebaceous glands (the latter usually at the base of hair follicles). This horny layer shows a minimum tendency to become hydrated at an acid reaction, close to that normally found on the skin surface (about pH 5). On soaking in alkali it imbibes water, swells and softens, and surface sheets tend to become detached. On thorough drying, it hardens and is easily cracked. Frozen sections, which have not been soaked in solvents like xylol, but have been stained with Sudan dyes to show up fat, show also a thin surface coating of lipids, apparently exuding from sebaceous follicles and spreading over the skin. These lipids can be removed more or less quantitatively from known areas of human skin with solvents such as acetone; the amounts recovered correspond to an average thickness of some $\frac{1}{2}\mu$ over the surface.

This lipid coating is very relevant to the problem of skin disinfection, for it has itself been found to be actively bactericidal, although only strongly towards certain organisms (Ricketts *et al.*, 1951). Chemical analysis of the mixed surface lipids proves the presence of about 40 per cent. of free long-chain fatty acids, half of these belonging to the unsaturated type of which oleic acid is an example (oleic acid has been positively identified in the mixture). These acids are known to destroy *Strep. pyogenes*, as well as other organisms which attack the skin more rarely, such as the bacillus of tuberculosis; the destruction of these organisms is accomplished in a matter of minutes rather than seconds—even hours may be required for completeness. This bactericidal effect of unsaturated fatty acids is prevented by the presence of serum albumin, so that the self-disinfecting power of the skin is liable to be inefficient if the surface is breached and an exudate escapes. Undoubtedly, the lipid coat also helps to preserve the horny layer intact by maintaining its proper hydration and toughness—the familiar experience of

'chapping' after excessive removal of surface lipids provides direct experience of this effect. An ordinary wash with soap does not remove all the surface lipid which can be extracted with solvents, and the deficiency it produces is restored within a few hours. More drastic, and especially repeated, removal may not be followed by such ready restoration.

Some organisms, notably the gram-negative species like 'Pyo' and other coliforms, are relatively insensitive to the action of the fatty acids, at least in the moist state. Their natural removal from the skin surface is apparently consequent upon ordinary drying. A simple experiment demonstrates this effect. Two small areas of skin are contaminated with a suspension of 'Pyo', and then immediately occluded under patch dressings of plastic film. One is covered with 'polythene', a plastic which is highly impermeable to water vapour, and so keeps the area moist with insensible perspiration. The other is covered with 'Type 8 nylon' film, which is equally bacteria proof but very permeable to water, so allowing normal drying of the skin. After a few hours, the nylon-occluded area is found to be free from 'Pyo', just as exposed skin would have been. The polythene-occluded area, on the other hand, still swarms with the organism. When this experiment is repeated with *Strep. pyogenes*, both areas are found to become disinfected, presumably from the chemical disinfectant action of the fatty acids. These properties of the normal skin surface may be taken as forming a background to the discussion of chemical disinfection; on occasion, perhaps, it may even be valuable to take advantage of these natural mechanisms.

GENERAL PROPERTIES OF ANTISEPTIC CHEMICALS

Today, the surgeon is clear about the qualities he would require of an ideal antiseptic:—

(1) It should be active against all pathogenic organisms.

(2) It should be free from toxic action on human cells, both from direct irritant effects and from delayed activity due, for example, to sensitization.

(3) It should act quickly—at least within a few minutes.

(4) It should be effective in the presence of serum, blood, pus and other organic matter.

(5) It should be stable, self-sterilizing in solution, and readily handled and dispensed.

(6) It should be cheap and available.

Yet, it seems, these simple requirements are not satisfied by any known substance. Cationic detergents (cetrimide will serve as an example) which are potently bactericidal in 1 per cent. solution against cocci, may contain numerous surviving bacilli for long periods if accidently contaminated, say, by material infected with 'Pyo'. This example of selective bactericidal action could be matched with many others, even outside the familiar chemotherapeutic and antibiotic group of drugs. The destructive action of antiseptics on human tissues is seen in varying degree, from the insidious effects of carbolic acid, to the events following the lively sting of iodine dabbed into

a cut. Delayed healing can be proved to follow the application of most of the flavine group if continuously applied to a wound in bactericidal concentrations. Sensitization of skin following the use of local sulphonamide therapy became notorious in the 1939-45 war, and it is known to occur on occasion after the application of cetrimide, iodine, flavines and penicillin, to mention only a few. Slowness of action makes many antiseptics virtually useless in surgical practice—mercuric salts, as an example, take many hours to effect complete sterilization.

It seems that perhaps too much is expected of an antiseptic. In particular, the requirements of speedy action, selectiveness as between the cells of the human body and those of the pathogenic organisms, while at the same time being effective against all pathogenic organisms, may be equivalent to demanding biological incompatibles. To theorize, it seems that rapidly acting antiseptics attack and degrade the protein structure of cell contents or cell walls. There is insufficient chemical difference between the make-up of a human cell and a bacterial cell to allow of differentiation by the blunderbuss type of antiseptic. The chemicals which distinguish, at least in certain concentrations, between human and bacterial cell systems probably act in the main upon enzyme systems, i.e., upon some aspect of cell metabolism. Killing a cell in this way may be compared with starving out a beleaguered citadel; both can be effective, but are essentially slow methods. The analogy can be pressed a little further: just as the half-starved defenders may be relieved, so bacteria recently treated with mercury salts in concentrations sufficient eventually to cause death can be revived by washing with certain chemicals containing –SH radicles. (Apparently, organisms treated with low concentrations of cetrimide and other cationic detergents may also be 'resuscitated' with anionic detergents, such as weak soap solutions.)

The overriding importance of the selective action of certain chemicals between human cells and bacteria is familiar from the great work of the Wright-Fleming school. The careful examination of leucocyte activity in various concentrations of drugs was the very basis of the discovery of penicillin. At present, it appears most likely that the immensely powerful antibiotic class of disinfectants, of which penicillin is still the most familiar example, exert their activity by interfering with an enzyme system concerned with bacterial cell division. As this process occurs, even under favourable conditions (for the bacteria), only about every thirty minutes, such chemicals act somewhat slowly by surgical standards. Those known at present, too, are all in varying degrees selective for certain groups of bacteria.

RATIONAL USE OF AVAILABLE SKIN DISINFECTANTS

As the ideal agent is not yet to hand, compromise rules for action must be considered. The best agent must be chosen for each practical situation.

Intact Skin

Disinfection of intact skin before a surgical incision.—The value of 70 to

80 per cent. alcohol liberally applied is well attested if some two to three minutes are allowed for the solution to act. (Weaker or stronger solutions are less effective.) Most organisms (perhaps not all spores) are killed. The careful work of Gardner (1948) has shown the added speed of action which is attained if 1 per cent. iodine is present, with the practical advantages of demarcation of the area treated. Alcohol alone may be used for the occasional patient who is iodine-sensitive. Iodine burns are sometimes seen in tropical climates if sweating occurs under a treated and bandaged area.

Disinfection of hands known to be contaminated from handling infected materials clearly requires washing in soap and warm water, especially to remove traces of serum, and the like. The hands may then safely be soaked for a few minutes in 30 per cent. solutions of para-chlor-meta-xylenol ('dettol') (Colebrook and Griffith, 1930), which is non-irritant and has a fairly wide spectrum of antibacterial activity. This chemical, like many others, appears to be relatively valueless in fatty ointments or creams (*cf.* flavine emulsion), as too little escapes into the aqueous phase to be effectively bactericidal against many organisms.

Repeated disinfection of nurses' and surgeons' hands in any complete sense is not feasible with any known substance without damaging the skin. This fact is accepted implicitly in theatre practice in the use of rubber gloves; it should also be recognized in so-called 'minor surgery' (actually the bulk of national surgical practice) by insisting on the use of a no-touch technique (Williams and Miles, 1949). Social cleanliness is required to remove detachable skin flakes; it is possible that added security is given by a rinse with sterile 1 per cent. cetrimide, or by immersion in 70 per cent. alcohol. Since *Staph. aureus* is the organism most to be feared on healthy hands, cetrimide is a suitable agent, and is apparently adsorbed on to the skin, leaving a bactericidal film for some hours. Either cetrimide or alcohol, used repeatedly, is liable to cause dryness and chapping in susceptible individuals unless counteracted by fatty creams.

The Open Wound

The fresh wound, apparently clean, is often contaminated, especially with *Staph. aureus*. That the natural defences of serum and leucocytes should be given a reasonable chance is the basis of modern surgical teaching. The removal of gross foreign contamination with detergents is desirable, and some disinfection of surrounding skin may be achieved by the use of sterile 1 per cent. cetrimide. (Repeated use of large stock-bottles presents the danger of 'cleansing' with suspensions of 'Pyo'—Lowbury, 1951.) Routine use of cetrimide in factory surgeries leads occasionally to ill-effects from sensitization. Evaluation of slow-acting antiseptics in the presence of open wounds has so far been impeded by the lack of a satisfactory occlusive dressing; reinfection through wet or serum-soaked gauze and bandages being so common as probably to swamp any beneficial results obtained. If the nylon-type occlusive dressing (Bull *et al.*, 1948; Schilling *et al.*, 1950) is satisfactory in

practice, the value in various circumstances of penicillin and other antibiotics as primary disinfecting agents should be reassessed. Since the surgeon faced by a wound with necrotic edges is at pains to excise all dead tissue, it is clearly unjustifiable to produce necrosis, even in trivial wounds, by the use of locally toxic substances such as those contained in the 'iodine bottle'. As sterilization of tetanus spores, even in a skin wound, is not feasible, antiserum is still needed in the appropriate circumstances.

FUTURE DEVELOPMENTS

Two extreme problems await attention. On the one hand, the orthopædic surgeon, conscious of the tragedy of a joint infected at the time of operation, strives for perfect sterilization of the skin field. For a deliberate operation of this kind, trial might be made of occlusion of the whole area under a vapour-permeable plastic, such as nylon film, for three to four days in advance. In laboratory trials so far, the normal self-sterilization of skin has been found to dispose of all pathogenic organisms in such circumstances. The additional use of penicillin on the skin has in an appreciable number of instances led to a completely sterile area of skin.

At the other extreme, we are still faced with the grossly infected skin, either as the result of disease or of trauma and contamination. Disinfection with antibiotics seems to provide hope of solutions to this problem. Since the range of activity of each of these substances is at present limited, mixtures may be called for. Current research on the analogous problem of the infected burn shows that a combination of penicillin (1000 units/gramme) with polymixin (0.1 to 1 per cent.)—a drug with remarkable activity again *Ps. pyocyanea*—is at least worthy of further trial.

It has been suggested that the views of the bacteriologist and of the surgeon have been widely at variance when considering the undoubtedly complex problems of skin disinfection. It may be hoped that current and future developments, along with a realization of the difficulties implicit in both of these specialized fields, are leading to a narrowing of this gap.

The views expressed in this discussion are my own. It is a pleasure to acknowledge the education and ideas received from colleagues in the Birmingham Accident Hospital when studying this subject, in particular from Dr. Elizabeth Topley.

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REVISION CORNER

THE TREATMENT OF ADDISON'S DISEASE

ADDISON'S disease is due to chronic insufficiency of the adrenal cortex. The essential metabolic changes are defective carbohydrate metabolism with a tendency to hypoglycæmia, and ionic imbalance with a decrease in plasma sodium (normal =320 mg. per 100 ml.) and in plasma chloride (normal=360 mg. per 100 ml. expressed as Cl), and an increase in plasma potassium (normal=20 mg. per 100 ml.).

The only effective treatment is by cortical extract or by synthetic adrenal hormones. Adrenal cortical hormones include corticosterone, deoxycorticosterone, 11-dehydro-17-hydroxycorticosterone (Kendall's compound E), and 11-dehydrocorticosterone (Kendall's compound A). Cortical extracts are sold under various names, e.g. 'eucortone', 'eschatin' and 'cortin'. The volume of injection required is considerable and the cost is high. In the United States a concentrated lipoid extract has been prepared which is five times as potent as the aqueous extract. The extract is not yet available in this country. The synthesis of deoxycorticosterone in 1938 has led to a considerable reduction in the use of cortical extract, for deoxycortone acetate is just as effective, except in the treatment of a crisis, and it is less costly and less bulky. Deoxycortone acetate does not control the impaired carbohydrate metabolism but it does correct the disturbance of sodium, potassium, and water distribution, and it is these disturbances which kill the patient with Addison's disease.

Since the introduction of substitution therapy in 1930, the prognosis has been greatly improved. At present 45 per cent. of patients are alive at the end of a five-year period.

PRINCIPLES OF TREATMENT

(1) Replacement of adrenal cortical hormones and supplementary minerals.

(2) Avoidance of conditions known to aggravate Addison's disease.

In managing a case of Addison's disease, it is essential to minimize the risk of crisis by increasing substitution therapy on the first sign of intercurrent infection, and by avoiding the use of general anæsthetics, particularly chloroform and ether, the opiates, and potassium salts.

Adrenal hormone is inactive when swallowed. It is administered either by intramuscular injection or by pellet implantation. In crisis, cortical extract is given intravenously. American investigators have used deoxycortone acetate, dissolved in propylene glycol, sublingually, and in the form of propylene glycol wax linguets for dissolving under the tongue. It has been found that intra-oral compared favourably with intramuscular administration. Other observers have not confirmed the reliability of intra-oral administration. Kendall's compounds A and E have been used with some success, but the clinical usefulness of these compounds remains to be demonstrated.

General measures.—Some of the milder cases may be maintained satisfactorily for a considerable time by an increase in the salt intake alone. This is best given in the form of enteric-coated capsules with meals. The total dose should be 5 to 10 g. per day. A low potassium diet is now considered of doubtful value, and has produced a condition resembling familial periodic paralysis. The diet should be nutritious, supplemented by vitamin C. Adequate rest and warmth are indicated.

DEOXYCORTONE (DOCA) BY INTRAMUSCULAR INJECTION

If with salt alone sufficient clinical improvement is not obtained, it is essential to begin substitution therapy. Extra salt should then be reduced to 3 g. per day. In cases of moderate severity DOCA is given in preference to cortical extract. DOCA is prepared in 1 ml. ampoules of arachis oil, 1 ml. containing 5 mg. of deoxycortone acetate, and is approximately equivalent to 10 ml. of cortical extract. An average initial dose is 5 mg. intramuscularly, daily, reduced later when the maintenance dose is being determined. A tendency to hypoglycæmia persists and is controlled by frequent carbohydrate feeds. The weight, blood pressure, clinical state, and heart size, as determined by radiography, should be watched carefully. Plasma sodium, potassium, and chloride should be estimated at frequent intervals.

Signs of overdosage of DOCA are hypertension, generalized œdema, and cardiac dilatation and failure. Fluid retention may involve the lungs without superficial œdema; it may be detected by crepitations at the lung bases. If signs of overdosage develop, salt and hormone should be reduced.

IMPLANTATION OF DOCA PELLETS

When satisfactory maintenance has been established by injection of DOCA for a period of two months, the question of implantation of DOCA tablets (e.g. 'percorten' pellets prepared by Ciba) should be considered. This obviates the need for frequent injections. Patients treated by implantation should be in receipt of 3 g. of salt per day, and if any sign of DOCA overdosage develops, the salt intake should be reduced. Each 125 mg. pellet implanted liberates, on an average, 0.5 mg. of hormone daily, so that a patient who has been maintained on 4 mg. per day will require implantation of eight pellets. For a case of average severity five tablets are implanted. As the effects of overdosage are severe, it is injudicious to use more than five pellets for an initial implantation.

The *technique* of implantation is relatively simple. Under local anæsthesia the pellets are implanted in the subcutaneous tissue of the abdominal wall, either directly or through a trocar. They should be placed at least 2 cm. from the line of incision to prevent extrusion. They provide a steady maintenance supply for nine to twelve months. A gradual reduction in weight and blood pressure is the first indication that the pellets are no longer providing sufficient hormone. Injection of DOCA, 2 to 5 mg. twice weekly, is then initiated. Later, daily injection of hormone is resumed, and a fresh assay is made, followed by implantation.

ADDISONIAN CRISIS

Massive therapy must be given quickly. In the presence of infection, specific chemotherapy is also started. The essentials are restoration of plasma volume and blood pressure, and neutralization of the tendency to hypoglycæmia.

Dosage.—1,500 ml. of 5 per cent. glucose saline should be given intravenously with 25 ml. of aqueous cortical extract. An additional 10 ml. extract is given subcutaneously, and this dose is repeated every two to four hours. A further 1,500 ml. of glucose saline is given in twelve hours, and repeated daily until the intake of fluids by mouth is satisfactory. An initial dose of 10 mg. DOCA is given intramuscularly, and 5 to 10 mg. is repeated daily.

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THE TREATMENT OF IRRADIATION SICKNESS

SICKNESS due to irradiation may occur under two conditions: (1) in patients undergoing irradiation treatment, usually by high voltage X-rays, for various diseases, most commonly malignant; (2) when the body is subjected to a single large dose of gamma rays as a result of an atomic explosion. This latter form, which may result in a very severe and often fatal illness, is fortunately not met with in ordinary civilian practice, and has been adequately dealt with in a previous issue (*The Practitioner*, 1950, **165**, 990).

Sickness due to irradiation applied for therapeutic purposes has been divided into three types:—

(1) *Toxic.*—This is a form of protein shock caused by the liberation into the blood of the breakdown products of a large highly radiosensitive tumour undergoing rapid resolution under the influence of irradiation.

(2) *Psychic.*—This occurs in highly strung or apprehensive patients who may anticipate sickness, often from ill-advised warnings of friends and even medical attendants, or who have suffered sickness during a previous course of treatment.

(3) *True irradiation sickness.*—The cause of true irradiation sickness is still obscure; many theories have been advanced but exact knowledge is lacking. It is generally assumed that circulating toxins, believed by many to be in the nature of histamine, resulting from damage to normal and abnormal cells by irradiation, are responsible. Some support is lent to this conception by the fact that it is only when a relatively large volume of body tissue, roughly in excess of that covered by a skin area of about 300 square centimetres, is irradiated will symptoms appear. Very heavy doses producing severe reactions, and even necrosis, can be delivered to small lesions in the skin, mouth, throat and vagina, without the production of irradiation sickness, but sickness may occur when a very large volume of body tissue is treated with a dose producing only a relatively mild, or no skin reaction. It should also be appreciated that the condition usually arises during irradiation of the trunk, the upper abdomen being particularly vulnerable. True sickness from irradiation of an extremity probably never occurs.

CLINICAL FEATURES

An initial feeling of langour is followed by anorexia which proceeds to nausea and ultimately vomiting. Vertigo may be present, and in severe cases prostration and severe weakness may supervene, the whole clinical picture being not unlike seasickness. Although symptoms may be very distressing, the grave complications resulting from severe damage to the hæmopoietic system common in atom bomb casualties are practically unknown in sickness resulting from the therapeutic administration of irradiation for disease, under proper conditions.

TREATMENT

It is true to say that there is no known antidote which will protect a patient against irradiation sickness, irrespective of the amount of irradiation delivered and the region treated. Although numerous remedies based on a multiplicity of theories as to the cause have been advocated from time to time, the only certain remedy is to stop or suspend irradiation, following which the symptoms usually subside in a few days. Certain lines of treatment have, however, proved of value in both prophylaxis and alleviation of symptoms when they arise.

General.—When this complication is anticipated, measures to improve the

patient's general condition should be started as soon as possible. His nutrition should be maintained or improved and any coexisting anæmia corrected. An adequate balanced vitamin intake should be ensured, particularly with regard to the B group. A highly nervous or apprehensive patient should be reassured and the possibility of sickness ought not to be stressed. A liberal fluid intake is encouraged with plenty of carbohydrates in the form of sugar or glucose; sweetened fruit juices are particularly suitable. It has been noted that patients suffering from chloride depletion are particularly vulnerable, and this should be guarded against by ensuring an adequate intake of salt.

Apart from these general measures, the following drugs and preparations among the many recommended have proved of benefit in this condition, and are worthy of trial.

Pyridoxine.—Deprivation of the vitamin B group has been observed to promote sickness, and of these, pyridoxine (B_6) has assumed a leading rôle in alleviation of symptoms. Given prophylactically in doses of 40 to 60 mg. daily by mouth the onset of sickness may be averted or minimized. When symptoms appear this dose may be increased to 100 mg. If no improvement takes place, or if symptoms become worse, intravenous administration in daily doses of 50 to 200 mg., according to the severity of the case, will often produce marked relief.

"*Benzedrine.*"—Based on the theory that irradiation sickness may be associated with dilatation and stagnation in the capillary bed, success has been claimed by the administration of benzedrine. Its value is uncertain, but in the early stage of langour and depression a dose of 2.5 to 5 mg. in the morning, repeated if necessary in the early afternoon, has proved beneficial and may avert further development of symptoms, particularly in apprehensive patients.

Dilute hydrochloric acid.—As symptoms are often associated with hypochlorhydria, successful alleviation may be obtained in moderately severe cases by the administration of dilute hydrochloric acid, 10 minims (0.6 ml.) in water.

Antihistamine drugs.—Reference has already been made to histamine toxicity, and good results have been claimed, in a certain number of cases, from the use of antihistamine preparations, of which two may be mentioned:—

'Benadryl' given orally in doses of 50 mg. every four hours for twenty-four hours, or in severe cases a single dose of 50 to 100 mg. intravenously.

Struck by the similarity with the symptoms of seasickness excellent results have been claimed from the use of 'dramamine' in irradiation sickness: 100 mg. is given thirty to sixty minutes before, and repeated twice at ninety-minute intervals after, each treatment of irradiation, making a total of 300 mg. In very severe cases still better results have been achieved by the administration of intravenous pyridoxine up to 200 mg. in combination with 'dramamine', than with either of these drugs alone.

The use of these antihistamine drugs may give rise to certain side-effects, such as drowsiness, nausea, and paræsthesia, whilst one report has indicated the complete failure of 'anthisan' to alleviate symptoms in a controlled investigation, with the production of a toxic erythema in a certain number of the cases investigated. Greater caution is therefore called for in the use of these drugs.

Deoxycortone acetate (DOCA) has been advocated, based on the view that it protects the liver from radiation damage, as well as having an indirect action against the effects of histamine. Particularly good results therefore have been claimed in cases of sickness during irradiation of the upper abdomen. Doses up to 5 mg. of

DOCA in oil, given intramuscularly every eight hours until symptoms subside, have been recommended; a total dose of 75 mg. should not be exceeded and a watch kept for symptoms of overdosage.

In conclusion, it may be said that of the several methods of treatment mentioned, the general measures combined with pyridoxine should be used initially as a routine, with the addition of benzedrine and hydrochloric acid when indicated. Should these measures fail, however, antihistamine drugs, including DOCA, may be given a trial. If in spite of this, sickness of increasing severity, particularly if associated with a progressive leucopenia, should manifest itself, irradiation should be discontinued.

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NOTES AND QUERIES

Travel Sickness in a Child

QUERY.—I have a little girl patient, aged five years, who is an extremely bad traveller. In a short time her parents intend making a trip to Malta and are most anxious to take their daughter with them. The outward journey consists of the following:—(1) By car to London—one day; (2) by train to Calais and then on to Rome—two days; (3) by sea to Malta—one day. Could you please tell me:

(i) What drugs to prescribe, the dosage, and how often to be given?

(ii) What inoculations would you advise me to give her (together with dose)?

(iii) Do you recommend small doses of nembutal (or such like), 0.5 grain (32 mg.), for children to ensure sleep?

REPLY.—(1) 'Dramamine' is probably the most effective drug in travel sickness, although recently its value has been doubted. It is not generally available in this country, but if it can be obtained it should be given in doses of 26 mg. before the day's journey, and once or twice during the day. In default of 'dramamine' another antihistamine drug, such as 'thephorin' (25 mg. at similar intervals) may be given. Hyoscine is perhaps better than nothing and may be given in doses of 1/480 of a grain (0.14 mg.) before starting, and once or twice during the day.

(2) (a) Vaccination or re-vaccination is essential.

(b) Immunization against the enteric group of fevers would be wise: T.A.B., 0.05 ml. followed by 0.1 ml. in one week.

(c) Diphtheria immunization should be confirmed by giving a 'booster' dose: A.P.T. 0.2 ml.

(3) Most children sleep well enough on journeys, if not actively travel sick, and in that case hypnotics are not likely to do more than make the child a little dopey and less easy to handle. It might be best to reserve the nembutal to ensure the mother's own sleep, but phenobarbitone, ¼ grain (16 mg.) each morning, might diminish excitability and apprehension.

It sounds as if the family would be well advised to travel by air, if they can manage it, as a long journey with a travel-sick child is going to be a considerable strain.

A. P. NORMAN, M.B.E., M.D., M.R.C.P.

Recurrent Bronchitis in Childhood

QUERY (from Cyprus).—A patient aged two-and a half years is having frequent attacks of bronchitis. They occur about every month to six weeks throughout the year.

Past history: Pneumonia twice, severe bronchitis twice in past two years. On examination between attacks the child is well, normal height, normal weight. X-rays show no changes. No abnormality in the chest. No finger clubbing. Mantoux test, negative.

The child is the only one and is adopted by intelligent parents, who spoil it. These attacks of bronchitis are causing me anxiety as I feel they must leave some scarring on the lungs and eventual fibrosis. I have instructed the parents to keep the child out of doors as much as possible as the climate in Cyprus is good.

(a) Is there anything I can do to lessen the attacks? (b) What will happen if they continue?

REPLY.—The frequent attacks of bronchitis in this child are probably due to one of the following:—(1) An inherited tendency to recurrent respiratory tract infection in early childhood. (2) A chronic focus of upper respiratory in-

fection. (3) Allergy. Fibrosis of the pancreas and congenital heart disease, which are sometimes associated with a recurrent bronchitis, seem unlikely in view of the child's otherwise good health.

The diagnosis might be clarified by repeated careful inspection for chronic enlargement of the tonsillar glands or a postnasal drip, and by X-rays of the nasal sinuses; also by doing a differential leucocyte count during an attack to see if there is any eosinophilia. Residence elsewhere than in Cyprus for a period, if practicable, might establish a possible allergic basis for the disorder. Lack of any positive evidence in the above directions would suggest a diagnosis of recurrent infective bronchitis, to which some young children are predisposed. Any family history of recurrent respiratory disease in early childhood would suggest such a predisposition and give an indication of the prognosis. This will probably not be obtainable since the child was adopted.

If no chronic focus can be found in the adenoids, tonsils, or nasal sinuses, and if no definite evidence of allergy can be obtained, symptomatic treatment will have to be continued. In addition, benefit might result from spraying the pharynx regularly and indefinitely with glycerin of thymol, 1 part, in water, 2 parts, three or four times a day. If no eradicable cause can be found in the upper respiratory tract and there is no evidence of allergy, the recurrent attacks of bronchitis will become less frequent and less severe, and should cease within the next two to three years. If allergic, the attacks might tend to increase in severity until they become frankly asthmatic. Undue anxiety about this child's complaint is probably being felt, since no permanent damage in the respiratory tract or lungs should have been caused, or will be likely to arise, unless any eradicable focus of upper respiratory infection is not dealt with or frank asthma develops. The atmosphere of anxiety which surrounds this child will doubtless be an aggravating factor if there is an allergic basis, but, in any event, this will distort the development of personality if allowed to persist.

J. L. HENDERSON, M.D., F.R.C.P.ED.

Hypertrichosis

QUERY (from India).—I should be grateful if you could let me know the best treatment for eradicating unwanted hair on the upper lip of an otherwise normal young girl of sixteen years. Would you also give me some references to articles on this subject?

REPLY.—The common type of hypertrichosis of the upper lip in young women unassociated with discoverable endocrine abnormality is genetically determined and is inherited as a simple dominant. It often causes distress out of all proportion to the actual cosmetic disfigurement present. If the hairs are fine and inconspicuous an effort should be made to reassure the girl that the hair is not evidence of masculinity and that treatment is best avoided. If the hairs are coarse and numerous the most satisfactory treatment is to remove them by electrolysis or with the bipolar diathermy. A full account of the techniques is given by Savill (1944). This treatment should be carried out only by an experienced operator, and the number of hairs removed at each session should be strictly limited if scarring is to be avoided. Depilating waxes and chemical depilatories are usually unsatisfactory, the former tending to produce a folliculitis and the latter destroying only the projecting part of each hair and being liable to cause dermatitis. If skilful removal of the hairs is impracticable, the use of a lotion containing equal parts of hydrogen peroxide and ammonia water as a bleaching and keratolytic application may make the hair less conspicuous. As a last resort in very extreme cases the use of an electric razor can be recommended, although there is still some doubt whether or not shaving leads to an increased growth and coarsening of the hair. On the whole the evidence suggests that it does not do so. Endocrine preparations are of no value, and the use of X-rays cannot be too strongly condemned, as the dose necessary to produce permanent depilation will inevitably cause scarring.

The whole problem of hair growth, both normal and abnormal, is considered in detail in a useful paper by Danforth (1939), in which a full bibliography is given. A more recent paper, limited to the type of hypertrichosis under consideration, is that by Bissell and Williams (1945).

H. J. WALLACE, M.D., M.R.C.P.

References

Bissell, G. W., and Williams, R. H. (1945): *Ann. intern. Med.*, **22**, 773.
Danforth, C. H. (1939): *Phys. Rev.*, **19**, 94.
Savill, A. (1944): 'The Hair and Scalp', 3rd edition, London, p. 281.

Cocoa as a Beverage

QUERY.—Recently I have seen articles in the American press condemning the use of cocoa, especially in children. What are the current views on cocoa as a beverage?

REPLY.—There seems no good reason why cocoa should be condemned. It is a nutritious food (generally about 18 per cent. protein, 26 per cent. fat, 36 per cent. carbohydrate, and some minerals), but in the amounts ordinarily taken it does not add much to a patient's diet; one cupful made with about a third of an

ounce of cocoa powder provides less than 50 calories. The only possible objections to cocoa are:—

(1) It contains theobromine in about the same proportion as caffeine in coffee (2 per cent.), but theobromine has little effect on the nervous system and does not cause sleeplessness. In any event the dose of theobromine provided by an ordinary cup of cocoa is so small as to be of no consequence.

(2) Cocoa tends to allay hunger because its fat content slows up the emptying of the stomach. It may therefore spoil the appetite if taken just before a meal, but the same applies to milk and many other excellent foods.

(3) In the preparation of cocoa the ground seeds of *Theobroma cocao* are sometimes treated with alkali to produce partial saponification of the fats, so that the powder makes a better suspension in water. It has been suggested once or twice that this process might make it harmful, but in fact this is exactly what happens to it anyway, once safely inside the human intestine.

According to an annotation in *Nutrition Reviews* (February, 1951) there have been various animal experiments in which the feeding of large amounts of cocoa interfered with the utilization of calcium. However, Mitchell and Smith (*J. Amer. med. Ass.*, 1945, **129**, 71) produced evidence that no such effect on calcium utilization could be observed in man when cocoa was taken in ordinary amounts. Bricker *et al.* (*J. Nutrit.*, 1949, **39**, 445) have recently published an elaborate experiment on feeding cocoa to American college women and following their calcium balance. No ill-effects were observed until the intake of cocoa reached 56 g. daily: there was then a decrease of appetite, headache and nausea. The review concludes that the ordinary human tolerance for cocoa is about 1 oz. daily, and it implies that on this intake the utilization of calcium cannot be seriously effected.

If we frown on cocoa we must presumably also ban chocolate, which is made from the same source. Our patients, whether young or old children, might take a poor view of this.

A. P. MEIKLEJOHN, D.M., M.R.C.P.

Emetine and the Heart

QUERY (from Pakistan).—A schoolmaster, now aged about forty-eight, was given two courses of emetine, 0.5 grain on alternate days for 12 injections, for amœbic hepatitis in 1930. His heart has apparently been affected, as on running a furlong or so he feels breathless and giddy, and the pulse becomes rapid and irregular. Heart examination shows no abnormality while at rest, except that the first sound is of a little lower pitch than normal, but not lower than the second sound. When examined after exercise it is quicker and irregular, missing beats; a soft systolic murmur is audible in the aortic area which is not propagated in any direction. I should be grateful for any advice you can give me.

REPLY.—The toxic action of emetine on the myocardium may become evident during, or a week or two following, the course of injections. A falling blood pressure is an early sign, and there may be dyspnœa, cyanosis, and faintness when the patient stands up, with electrocardiographic changes such as temporary flattening of T waves and inversion of P waves. Occasionally, auricular fibrillation may occur. Such findings are by no means common, and some authorities consider that the toxicity of emetine has been over-emphasized, but it is generally agreed that to keep the patient in bed during emetine treatment is a wise precaution. An important point, however, is that the toxic effects of emetine are usually transient, rarely lasting for more than a month or two, unless very high dosages, for instance 100 grains or more, have been used.

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Lieut.-Colonel R.A.M.C.

A Case of Subfertility

QUERY.—A healthy man, aged thirty-six, with no previous relevant illness, has been married for about six years. Four years ago his wife conceived, and they lost a post-mature hydrocephalic. I give the husband's semen report after treatment over several months with methyl testosterone.

Volume: 5 to 6 ml.
Density: 300,000 per ml.
Motility: 45 per cent.
Anisospermia, monsters and pinheads.

The wife has been declared normal.

Is this a hopeless case in which adoption should be advised, or is there a chance of improvement by treatment of the husband; and what are the risks of another abnormal fœtus?

REPLY.—The prospects for a wife's conceiving when her husband's semen is of such poor quality as that reported are very slight. The couple would therefore be well advised to adopt a child. When a woman does conceive when fertilized with semen in which abnormal forms of spermatozoa are present, the usual result is death of the embryo and an early miscarriage. I do not advise treatment in this case; first, on the grounds that the outlook for treatment is poor; and secondly, because it is difficult to base a treatment simply on the semen report. A general systemic overhauling of the patient is almost always necessary in order to discover the presence of anything which might partly account for the subfertility.

KENNETH WALKER, M.B., F.R.C.S.

PRACTICAL NOTES

Vitamin A and Premenstrual Tension

'CONSIDERABLE improvement' is reported by J. Argonz and C. Abinzano (*Journal of Clinical Endocrinology*, December 1950, **10**, 1579) from the use of vitamin A in the treatment of premenstrual tension. This report is based upon the findings in the first thirty patients treated, whose ages ranged from seventeen to forty-seven, and of whom 14 were unmarried and 16 married. Vitamin A was given orally: 100,000 I.U. twice daily from the fifteenth day of the menstrual cycle to the first day of menstruation, inclusive. In most cases it was found necessary to repeat this course over a period of three to four months. The major manifestations of premenstrual tension in these patients were mastodynia, abdominal tenderness, œdema and nervous tension. All of them complained of tenderness of the breasts, and in only one of these was there no alleviation from the use of vitamin A; in the vast majority it practically disappeared. Of the 22 patients complaining of abdominal or pelvic pain, 12 were completely relieved and 10 showed marked improvement. Fourteen out of the fifteen patients with œdematous infiltration of the subcutaneous tissues, most marked in the legs, were freed of it. Signs of nervous tension, e.g. headache, irritability, and the like, disappeared in 9, and were markedly improved in 14, of the 23 patients with these manifestations. Of the 24 patients with dysmenorrhœa, 17 obtained complete relief and 7 were much relieved. In three cases there was a lengthening of the menstrual cycle. On the subject of rationale the authors state 'without being able to offer any sound experimental or clinical proof, we set forth the hypothesis that vitamin A acts by modifying a disorder in the metabolism of estrogens'.

Nicotinic Acid in the Treatment of Migraine

A SERIES of 25 cases of long-standing migraine, 17 women and 8 men, have been treated with nicotinic acid or sodium nicotinate by M. Cachin and J. L. Beaumont (*La Semaine des Hôpitaux*, March 26, 1951, **27**, 977). In some cases an intravenous injection of 50 mg. of sodium nicotinate was administered slowly at the onset of the attack. There was intense vasomotor reaction with bright-red flushing of the face, tingling in the limbs, and a sensation of heat. The action on the migrainous attack, however, was striking: there was almost immediate sedation followed by a feeling of well-being. Because of the unpleasantness of the vasomotor 'flushing', intramuscular administration was resorted to in some cases, and in others oral administration of nicotinic acid, in dosage of 70 to 120 mg. A vasomotor reaction still occurred, but it was less intense. When the drug was given by mouth a larger dosage was employed: for example, a patient who responded to 50 mg. intramuscularly, needed 120 mg. by mouth. Of the 25 cases treated, results were highly favourable in 15: there was immediate or rapid cessation of the attack, with disappearance of the headache and accompanying nausea. A maintenance treatment was instituted in the cases which responded satisfactorily: oral administration of 60 to 100 mg. of nicotinic acid daily, in three divided doses, continued for several weeks. Although the preventive action of the drug was less marked, results were nevertheless good in some cases. In cases in which the migraine is associated with the menstrual cycle, nicotinic acid should be prescribed to be taken during the ten days preceding the menstrual period.

Tromexan

TROMEXAN, which is a coumarin derivative with the formula, 3,3′-carboxymethylenebis(4-hydroxycoumarin) ethyl ester, is an anticoagulant which is active by mouth and is said to be more rapidly utilized, and more quickly excreted, than dicoumarol. G. E. Burke and I. S. Wright (*Circulation*, February 1950, **3**, 164) record their observations in animals and in patients. To 24 normal individuals, used as controls, they gave single doses by mouth of 1,500 and 1,800 mg. Twenty-four hours later the prothrombin time was 20 to 30 seconds (undilute plasma) compared with control readings of 15 seconds, and 65 to 100 seconds (dilute plasma) compared with control readings of 38 seconds. With the undilute plasma method, consistent prolongation of the prothrombin time was obtained in the minimum time of 15 to 18 hours, and following a single dose the prothrombin time has returned to normal in 48 to 60 hours. No toxic signs were detected. In 112 patients with thromboembolic disease, microscopic hæmaturia was noted in three patients, all of whom had pre-existing renal disease; and one patient with liver disease showed alterations in the cephalic flocculation test. Satisfactory maintenance of a therapeutic level of hypoprothrombinæmia was achieved by an initial dose of 1,200, 1,500 or 1,800 mg., followed by a maintenance dose of 600 to 900 mg. daily. This maintenance dose

was usually given as a single dose, but in cases which showed marked fluctuations in their daily prothrombin times, divided doses of 300 mg. thrice daily, or 600 mg. twice daily, were given. Emphasis is laid upon the fact that, if a therapeutic level is to be maintained, a period greater than twenty-four hours should not elapse between the administration of each dose. The tablets are bitter and should be swallowed intact. There is little cumulative effect of the drug. The antagonizing action of water-soluble vitamin K was studied in three normal subjects, and it is concluded that 'vitamin K does apparently effectively combat the anticoagulant activity of tromexan'.

Allergy and the Urinary Tract

In reporting five cases of genito-urinary disturbances due to allergy or drug idiosyncrasy, J. S. Eisensteadt (*Journal of Urology*, January 1951, **65**, 154) emphasizes that the diagnosis in such cases is usually one of exclusion. The first case was that of an inspector of dried milk plants who reported on account of hæmaturia, and was found to be allergic to milk. On investigation it was found that all red cells disappeared from the urine when he refrained from contact in any way with milk, to recur on exposure—even to the fine dust at dried milk plants. The second was a doctor's wife with renal colic and hæmaturia who was found to be allergic to codeine. The third was also a doctor's wife with renal colic and hæmaturia, in whom the diagnosis was not made until she suddenly developed an attack of asthma after eating a salad with Roquefort cheese dressing. Investigations then showed her to be sensitive to moulds, and avoidance of these was accompanied by freedom from her urinary symptoms. The other two cases were both elderly men with symptomless enlargement of the prostate. One had asthma and the other was sensitive to certain proteins. In both cases treatment of the allergic condition with adrenaline resulted in acute retention of urine, which was shown to be due to the adrenaline. These two cases are assumed to be cases of drug idiosyncrasy, rather than allergy. Among the points in establishing a diagnosis of allergy in such cases, the following are the most important: 'The characteristic finding of preponderance of mononuclear leucocytes in the urinary sediment, many or all of which are eosinophils, suggests the likelihood of an allergic basis. The failure of response of urinary colic to the usually prescribed antispasmodic drugs and its rapid though temporary response to neosynephrin, may also suggest an allergic origin of the cramping pains. Elimination of the offending substance with complete freedom from symptoms is very significant, especially if, after an interval, exposure to the allergen reproduces the symptom complex for which the patient sought relief'. A careful history is also important, particularly for other manifestations of allergy, e.g. hay fever, or a family history of allergy.

'Cafestol' in Rheumatoid Arthritis

The results of a clinical trial of 'cafestol' (the unsaponifiable fraction of the seed of *Coffea arabica L*), a substance which has been stated by previous observers to possess a steroid configuration, and 'to have the same clinical applications as the most potent steroids of animal origin, such as "cortisone"', is recorded by G. N. Myers and D. N. Ross, of the Regional Medical Research Centre, Royal Bath Hospital, Harrogate (*Lancet*, March 17, 1951, **i**, 640). The drug, which is manufactured in Italy, was in short supply, so that only two cases could be treated. One, a forty-five year old woman with a history of rheumatoid arthritis for twenty-two years, was given the Italian product, in which the drug is dissolved in olive oil: 400 mg. intramuscularly daily for three days, then 200 mg. daily for nine days. After receiving 3000 mg. there was slight decrease in the joint pains (which had been acute on admission to hospital five days before starting treatment) and slight improvement in movement; and no new sites of pain and swelling appeared. There were no marked changes in laboratory findings; the patient, however, appeared happy and generally improved. There was some nausea on the fifth day of the injections but no vomiting; also the patient complained of a 'persistent taste of chlorodyne', which decreased after reduction of the dosage to 200 mg. daily. The second case was a young woman of twenty-two with a history of rheumatoid arthritis of the hands for two years. This was a case of stage-2 rheumatoid arthritis, hospitalized for six weeks before beginning of treatment. She was given 400 mg. of a British substitute for cafestol (drug dissolved in propylene glycol), intramuscularly daily for three days; then 200 mg. daily for nine days. In this case also, there was gradual reduction of joint pains and the patient became much more cheerful. No significant changes in the laboratory findings were noted.

Sleep Therapy in Duodenal Ulcer

Based on the findings of Fulton, whose experiments demonstrated the existence of nerve paths between the higher parts of the brain, the hypothalamus and the alimentary tract, and also the findings of Wolf and Wolff, in their subject 'Tom', i.e., that if he 'went to sleep with a quiet mind his mucosa remained pale and inactive, but if in a disturbed state sleep did not

alter its engorged and reddened appearance', M. Dillon (*Irish Journal of Medical Science*, January 1951, p. 27) has carried out investigations to determine the effect of deep, dreamless sleep on the healing of duodenal ulcer:—

Thirteen patients, in whom a previous test meal had shown a high or comparatively high acidity, were given 2 tablets of 'soneryl' with a Ryle's tube passed down at 9 p.m., through which two-hourly specimens of gastric juice were drawn off without waking the patient. Nine showed marked reduction in the HCl, and of the nine, six went down to zero between 1 a.m. and 5 a.m.

The author gives details of two cases treated successfully by sleep therapy. The patients were put to bed in a quiet room, with the following diet:—

6.30 a.m.	Porridge and milk. 2 cups of tea. Egg flip Bread and butter.
7.00 a.m.	2 'soneryl' tablets.
9.30 a.m.	Glass of milk and 'casinal'.
9.45 a.m.	2 'soneryl' tablets.
12.30 p.m.	Cup of soup (non-greasy); glass of milk; glass of water. Creamed chicken, rabbit, fish, or mince. Mashed potatoes. Milk pudding or jelly. 2 cups of tea.
1.00 p.m.	2 tablets of 'soneryl'.
3.30 p.m.	2 cups of tea. Sponge cake or biscuits.
4.00 p.m.	2 tablets of 'soneryl'.
6.30 p.m.	Egg flips or lightly boiled egg. Glass of milk and 'casinal'. Biscuits and cheese or mince and slice of bread. 2 cups of tea.
7.00 p.m.	2 tablets of 'soneryl'.
10.30 p.m.	Cup of cocoa. 2 cups of tea. Sponge cake or biscuits.
11.00 p.m.	2 tablets of 'soneryl'.

The fluid intake was assessed to make up loss by excretion during sleep. The tea was weak, with sugar or glucose.

The first patient treated was a man of fifty-five, with a large duodenal and larger gastric ulcer. His acidity was high, but a twenty-four-hour test showed reduction to zero during sleep on 'soneryl'. On the second day the patient vomited; but from the fourth day he did not look back. In a week there was obvious increase in weight; the pain and tenderness had decreased, and at the end of two weeks the only pain complained of was due to wind. X-rays showed that the duodenal bulb, visible before treatment, had completely filled; the gastric ulcer had diminished but was still apparent. The patient was discharged after another week, free of pain and 'feeling grand', and having put on a stone in weight. One month later X-rays showed the duodenal ulcer still healed, and the gastric ulcer again decreased, but just visible.

The second case was somewhat similar, but there was no gastric ulcer. The patient, a male aged thirty-four, had been treated by diet and alkalis without success. X-rays showed a deformed duodenum with an ulcer crater. He was put on sleep therapy, with the same diet as the first patient, except for milk and water instead of tea, at his own request. There was vomiting on the second and third day, but thereafter the condition improved. At the end of two weeks. X-rays showed slow filling of the ulcer crater. After another week's treatment the ulcer was no longer visible, although there was some spasm of the pylorus. This patient also stated that he 'felt grand'.

In conclusion the author says: 'Two instances are naturally insufficient to establish a proof of any theory but, coupled with the results of nocturnal secretion tests and cold logic, they are, we think, adequate grounds for offering them as a basis for further investigation . . .'

Brewer's Yeast in the Treatment of Hepatitis

THE results of treatment with brewer's yeast in 126 cases of early acute and subacute hepatitis are given by N. Davis (*Medical Journal of Australia*, November 25, 1950, **37**, 790). The patients were divided into three grades: (1) those with liver deficiency greater than 50 per cent.; (2) those with liver deficiency of more than 25 per cent. and less than 50 per cent.; (3) those with liver deficiency of more than 10 per cent. and less than 25 per cent. (early cases). Severe cases were kept at rest in bed for four to six weeks; all other patients carried on with their ordinary duties. All patients received a high calorie diet: 140 g. protein; 350 to 400 g. carbohydrate; 70 g. fat. In addition, 30 mg. of vitamin B_1, 5 mg. of riboflavine, and 25 mg. of niacin were given. All patients received dehydrated brewer's yeast, 12 g. daily. Some of the more excitable patients received phenobarbitone, 0.5 grain (32 mg.) three times daily. Treatment was continued for periods of from less than one year to eight years. Cure, i.e. liver function tests returned to normal, was obtained in 29 cases; improved, i.e. disappearance of symptoms but, although improved, liver function tests did not become normal, 40; relieved, i.e. decrease in symptoms but little variation in liver function tests, 52. Of the 126 patients treated, 54 were females, and 72 males. Seven of the female patients became pregnant while under treatment, and all were delivered of a live baby at full term, without undue symptoms of toxæmia of pregnancy. The importance to prognosis of the early diagnosis of hepatic disease is stressed.

Obesity Following Streptomycin Therapy in Tuberculous Meningitis

IN a short note in *Médecine et Hygiène*, January 15, 1951, **9**, 18, attention is drawn to a late complication of tuberculous meningitis when treated with streptomycin, i.e. obesity, which has been discussed by Professor G. Mouriquand (*Lyon Médical*, November 26, 1950) on the basis of observations carried out at the Pædiatric Clinic, Lyons. The obesity, which is diffuse and involves all parts of the body, usually develops six to twelve months after the beginning of treatment, and is progressive in spite of dietary regimes. There are no associated disorders—no sexual changes, headaches, or disturbance of sleep. It was also noted that the obesity occurs only in those who are cured; and although it may be more common in girls, in the series studied there was an equal number of boys. As regards pathogenesis, the questions of immobilization, generous diet, and even streptomycin itself were considered, but observation of 150 other patients living under the same conditions did not confirm these hypotheses. The conclusion arrived at was that the obesity was of central origin, similar to that following other cerebral disturbances, and particularly epidemic encephalitis.

REVIEWS OF BOOKS

British Surgical Practice: Vols. 6, 7 and 8. Edited by Sir Ernest Rock Carling, F.R.C.S., F.R.C.P., and Sir James Paterson Ross, K.C.V.O., M.S., F.R.C.S. London: Butterworth & Co. (Publishers) Ltd. 1949, 1950. Pp. xxvi and 554; xxvi and 591; xxi and 597. Figures 280, 339, and 264. Price 60s. each. Index, pp. vii and 363. Price 20s.

The publication of the Index Volume completes this important work, and brings order and cohesion to the eight volumes that precede it. The first five volumes have already been reviewed in *The Practitioner*.

Volume six starts with malingering and finishes with peritonitis, a state which the malingerer often simulates; only a few of the chapters, not necessarily the most important ones, can be mentioned. N. R. Barrett gives a scholarly and complete account, beautifully illustrated, of the diseases of the mediastinum. The chapter by Stanford Cade and Stanley Lee on malignant disease of the mouth and pharynx is a monograph on the subject; it includes many figures and a number of colour photographs illustrating the changes that follow radium treatment, as well as descriptions of operative technique, of which the account of block dissection of the neck may be singled out as particularly helpful. Pulvertaft writes well of tendon suture and tendon grafting. Dible, writing on neoplasms innocent and malignant, contributes one of those essays on general principles which are an original and really helpful feature in this encyclopædia. The chapter on peripheral nerve injuries by Athol Parkes is an admirable and up-to-date review of this subject. John Angell James provides a clear and well-illustrated description of the surgery of the nose, nasopharynx and accessory sinuses. Guttman's chapter on the management of paralysis is an excellent account of an aspect of traumatic surgery that he has made particularly his own, and to which he has brought fresh light and fresh hope. Sir William Fletcher Shaw writes of gynæcological displacements with such lucidity and such admirable diagrams, that every reader with access to a patient and a set of tools will be tempted to try his hand at repair.

Volume seven contains three chapters on thoracic surgery, a specialty in which Britain excels, by acknowledged leaders, Holmes Sellers, Russell Brock and Price Thomas; these chapters, on pulmonary tuberculosis, the pleura, and pulmonary abscess, are as good accounts as can be found anywhere. D. W. Smithers writes of radiotherapy, handling his subject in the way that users rather than experts want to have it handled, that is, explaining its mode of action, the principles of dosage, and the indications for its use. Lloyd-Davies and Naunton Morgan contribute a chapter on cancer of the rectum, authoritative yet clear and concise, that will rank as a classic. Diseases of the rectum are fully covered, since in adjacent chapters Cuthbert Dukes writes of benign tumours, Milligan of hæmorrhoids, Rupert Corbett of proctitis, and Henry Thompson of prolapse. Of the remaining chapters in this volume those by R. T. Payne on the salivary glands, by A. K. Henry on schistosomiasis, by Joe Pennybacker on sciatica, and by Malkin on the spinal column, deserve special praise.

In volume eight, A. K. Henry discusses the surgery of the spleen with that originality and clarity of diction that characterizes all his writings. Norman Tanner gives an excellent account of the diseases of the stomach, with many illustrations in colour. Darmady and Reid contribute a practical and helpful article on the treatment of uræmia. Pomfret Kilner writes of plastic operations for the treatment of hypospadias and epispadias. Gordon Murray has a most stimulating article on vascular surgery in which he is concerned only with the heart and great blood vessels, and chiefly with operations for the relief of congenital abnormalities, *quorum pars magna fuit*.

Two of the happiest men in London today must be Sir Ernest Rock Carling and Sir James Paterson Ross, the editors of this encyclopædia, who have not merely planned this ambitious project, but have selected the writers, scanned and commented on their contributions, and been responsible for what the film world calls continuity. With its completion, they can look upon their work and see that it is good. Some may criticize the encyclopædic system, which is apt to lead to the splitting of parts of the same subject between different authors and their relegation to different volumes, but no reader can fail to admire the skill with which the Editors have chosen their experts, selecting in each case men whose names carry unquestioned authority, yet distributing the labour and the credit very fairly between the medical schools of the English-speaking world. Every surgeon will need to consult 'British Surgical Practice' at frequent intervals, so that by buying his own set now he will save more than its cost in transport to and from the library.

Lumbar Puncture and Spinal Analgesia. By R. R. MACINTOSH, D.M., F.R.C.S., D.A. Edinburgh: E. & S. Livingstone Ltd., 1951. Pp. viii and 149. Figures 111. Price 21*s.*

THIS is an excellent little book clearly written, beautifully illustrated and admirably produced. The chapter on early history is interesting and informative, and the section dealing with the anatomy of the spinal column is profusely illustrated. Miss MacLarty is to be congratulated on her magnificent drawings and diagrams. There is a chapter dealing with sterilization of the skin, and of syringes, and needles. The technique of lumbar puncture is clearly explained and illustrated. The dosage of 18 ml. of light nupercaine for a partial gastrectomy seems a little generous, but this is a minor criticism. Headache is admirably dealt with, although other possible neurological sequelæ are not mentioned. The final chapter on 'Do's and Don'ts' is important. This is a book to be recommended wholeheartedly, both to the practitioner and to the houseman.

Color Atlas of Pathology. Prepared under the auspices of the U.S. Naval Medical School of the National Naval Medical Center, Bethesda, Maryland. Philadelphia, Montreal and London: J. B. Lippincott Company, 1951. Pp. vii and 546. Figures 1053, in colour on 365 plates. Price 140*s.*

THE authors believe that the profession of medicine has lacked 'a comprehensive, concise and realistic source of reference with reproductions in full colour which would bring to the student, the clinician, and the laboratory diagnostician a readily utilizable and intelligible standard of comparison as a guide in the study and interpretation of both gross and microscopic findings'. The title of the work 'Color Atlas of Pathology' aptly describes their successful attempt to meet this need.

The general layout of the book is unusual. It is divided into sections dealing with the hæmatopoietic system, reticulo-endothelial system, respiratory tract, cardiovascular system, liver, alimentary tract, kidney and urinary tract, and musculo-skeletal system. Each section begins with a brief description of the pathological headings which will be dealt with in the section, the following pages consisting of brief factual notes on individual patients with a few illustrations of macroscopic specimens and rather more sections of the organs actually found in the patient. The printed matter occupies half the page; the illustrations the other half. There are also a few diagrams, illustrations of patients or parts of patients, and X-rays. All the illustrations are in colour and the vast majority of them are extremely good. The magnification of the histological preparations is mentioned in each case, but the reduction in size of the macroscopic specimens is not mentioned. In the majority of instances this does not matter greatly, but in such organs as the heart and liver it might do something to help in the appreciation of either hypertrophy or atrophy. Nervous tissues and genital tissues, male and female, are omitted.

The book is didactic, objective and clear and is the most successful attempt in recent times in the production of a comprehensive atlas of pathological conditions. Because of its 1,053 figures in colour it is expensive, costing £7 in this country, but in spite of this it can be recommended for libraries, pathologists and practitioners interested in pathology.

Bronchœsophagology. By CHEVALIER JACKSON, M.D., Sc.D., LL.D., F.A.C.S., and CHEVALIER L. JACKSON, M.D., M.Sc., F.A.C.S. Philadelphia and London: W. B. Saunders Company, 1950. Pp. 366. Figures 260. Price 63*s.*

THESE well-known authors have once again produced an excellent book. Three editions in English of their previous textbook on bronchoscopy and œsophagoscopy were published, the last in 1934. There was therefore great need for the present book. The vast experience it incorporates makes it of outstanding value. There is a short but clear and well-illustrated section on the anatomy of the tracheo-bronchial tree and the lungs. Large sections are devoted to the removal of foreign bodies. Any surgeon with a difficult foreign body problem will find these sections most useful. Diseases of the œsophagus, trachea and bronchi are adequately and interestingly described. The illustrations are profuse and clear, and particularly valuable are the coloured illustrations of bronchial and œsophageal diseases. This will be the standard work on the subject, and it should be in the hands of all endoscopists.

Lecture Notes on Emergency Diagnosis Without Laboratory Aid. By PROF. DR. HANNS L. BAUR. Revised by JEAN GRANT, M.B., M.R.C.P.ED. Oxford: Blackwell Scientific Publications Ltd., 1951. Pp. xii and 68. Price 6*s.*

IN an emergency a diagnosis has often to be reached without laboratory help. It is therefore refreshing in these days to read a book the aim of which is 'to see that clinical judgment should not become a lost art'. This short book is not

one to pick up when the emergency arises but rather one for the senior student and practitioner to study at leisure. Two chapters on diagnostic odours, and the patient's face and position contain many helpful and often neglected points. Respiratory failure is well described. This book is worthy of perusal by all clinicians.

Eternal Eve. By HARVEY GRAHAM. London: William Heinemann (Medical Books) Ltd., 1950. Pp. xx and 699. Plates 21. Figures 20. Price 42*s.*

THIS is a worthy successor to the author's 'Surgeons All'. It does for midwifery and gynæcology what its predecessor did for surgery—provides a history of the subject from the beginning of time to the present day. Medical historians may well be able to pick holes in some of the author's reconstructions and interpretations, just as they may be able to detect inaccuracies, but this will not detract from its attractions for the vast majority of its readers. 'Harvey Graham' has the enviable combination of a telescopic mind and the ability to write attractively and simply. In other words, he can focus a decade into a few well-chosen and illuminating sentences. The only disappointing section is that dealing with the present century. Here the author has degenerated into a mere medical reporter. In preparing the new edition which will undoubtedly be called for, he will be well advised to end his tale at the turn of the century. The only other criticism that might be offered is of the tendency to introduce irrelevancies: for instance, long accounts of Lister, Pasteur and Rœntgen are not essential to a history of midwifery and gynæcology. Any member of the medical profession who omits to read this book is depriving himself of one of the genuine pleasures of life.

NEW EDITIONS

Recent Advances in Ophthalmology, by Sir Stewart Duke-Elder, K.C.V.O., D.SC., M.D., F.R.C.S., F.A.C.S., and Allen J. B. Goldsmith, M.B., B.S., F.R.C.S., in its fourth edition (J. & A. Churchill Ltd., 28*s.*) contains admirable accounts of recent work on the nature of the intra-ocular fluids, the vitreous, the blood aqueous barrier and the biochemistry of the lens. The combination of authorship is well suited to its purpose, for one has had extensive experience as a biochemist and physiologist, and the other has been well trained in pathology. The book deals comprehensively with current problems of ophthalmic interest, in particular with the work on aqueous veins, the use of the gonioscope, and the present views of the pathology of glaucoma. There is also up-to-date information about antibiotics, chemotherapy, toxoplasmosis, virus diseases, allergy, Sjögren's syndrome, corneal permeability, and endocrine exophthalmos. This book is an admirable correlation of the work of the laboratory with that of the clinic. It merits careful and thorough reading by all who are interested in the lively advances of ophthalmology.

THE publication of the first volume of *A Text-Book of X-Ray Diagnosis*, by British authors, edited by S. Cochrane Shanks, M.D., F.R.C.P., F.F.R., and Peter Kerley, M.D., F.R.C.P., F.F.R., D.M.R.E., completes the second edition of this well-known textbook of X-ray diagnosis (H. K. Lewis & Co., Ltd., 45*s.*). It deals with the 'central nervous system', the 'teeth and jaws', the 'eye', and the 'nasal sinuses and temporal bone'. In the section on the central nervous system, by Sir Hugh Cairns and Dr. M. H. Jupe, the chief additions are an account of pyography and an extension of the section on cerebral angiography to a most valuable treatise on this subject with 47 excellent illustrations. The section on the spinal cord includes a more detailed account than the previous edition on the diagnosis of lumbar disc protrusion. The section on the eye has been rewritten by Mr. R. G. Reid. The fourth section, concerned with the radiology of the accessory nasal sinuses, has been entirely rewritten by Sir Harold Graham-Hodgson. This volume will be indispensable to any radiologist, neurologist or oto-rhino-laryngologist.

THE eighth edition of *A Text-Book of Gynæcology*, by James Young, D.S.O., M.D., F.R.C.S.ED., F.R.C.O.G. (A. & C. Black, 40*s.*), appears only three years after its predecessor. Apart from the sections on diagnosis and surgical procedures, those on treatment, in which the use of different drugs and their dosage are included, are of practical import; for example, in the chapters on menstruation, endocrine therapy is dealt with in detail, and in that on gonorrhœa, chemotherapy with the sulphonamides and penicillin. The illustrations are well produced.

Physical Diagnosis, by Ralph H. Major, M.D., in its fourth edition (W. B. Saunders Company, 32*s.* 6*d.*) has been revised and new material added. The first chapter is devoted to pain and its significance; then follows a chapter on general inspection, before the author proceeds to chapters devoted to the physical findings in diseases and abnormalities of different parts and organs of the body. The illustrations, which total 469, are used most effectively to demonstrate diagnostic points. The final chapter is devoted to history taking and recording.

The contents of the June issue, which will contain a symposium on 'Hypertension', will be found on page lxiv at the end of the advertisement section.

Notes and Preparations, see page 521
Fifty Years Ago, see page 525

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NOTES AND PREPARATIONS

NEW PREPARATIONS

'ALGIPAN' BALM (methyl nicotinate 1 per cent., histamine dihydrochloride 0.1 per cent., glycol salicylate 10 per cent., capsicin 0.1 per cent.) has been prepared for use in the treatment of pains of rheumatic and muscular origin, such as fibrositis, myalgias, and allied conditions. The drugs are incorporated in a vanishing cream base to ensure rapid absorption. Issued in tubes of 40 g. (John Wyeth & Brother Ltd., Clifton House, Euston Road, London, N.W.1)

DESCLERAN, a new drug prepared for use in the treatment of arteriosclerosis, has the following formula:—iodocholine iodide, 0.005 g., yohimbine phenylethylbarbiturate 0.0025 g., quinine phenylethylbarbiturate 0.020 g. Issued in the form of sugar-coated tablets, in tubes of 30, and in dispensing packs of 250. (Bengué & Co., Ltd., Mount Pleasant, Alperton, Wembley, Middlesex.)

ESTOPEN is the hydriodide of benzylpenicillin (penicillin G) diethylaminoethyl ester, issued as a sterile dry powder with suitable buffering and suspending agents to form, on the addition of water, a homogeneous suspension which can be withdrawn with ease for injection. It is claimed that 'estopen' is 'a new chemical derivative of penicillin having an exceptional affinity for the lungs, through which it appears to be selectively excreted so that relatively high penicillin concentrations are produced in the lungs and bronchial tree'. The use of 'estopen' is indicated in the treatment of penicillin-sensitive infections of the lungs, pleura and bronchi, and prophylactically before and after thoracic surgery. Issued in single dose vials of 500,000 units. (Glaxo Laboratories Ltd., Greenford, Middlesex.)

MALAZOL (3-allyl-5-methyloxazolidine-2:4-dione), an oxazolidine-2:4-dione derivative, is a new anticonvulsant drug which is stated to be effective 'in controlling or completely inhibiting *petit mal* attacks and other seizures'. Advantages claimed for the new drug are its efficacy, which is stated to be twice that of 'trimethadione', low toxicity, and the fact that it does not cause photophobia. Issued in capsules of 0.3 g., in containers of 100. (British Schering Ltd., 229-231 Kensington High Street, London, W.8.)

PHYTODERMINE cream and dusting powder have been prepared for use in the treatment of athlete's foot. The former contains phenylmercuric acetate, with terpineol and salicylic acid in an oil-in-water emulsion base, which is stated to have good penetrating action without being unduly greasy or staining the clothing or bed linen. The powder contains methyl *para*-hydroxy benzoate, combined with salicylic acid in a perfumed talc base. In addition to the treatment of athlete's foot, the use of 'phytodermine' cream and powder is indicated in tinea cruris and fungous infections of the face. The cream is issued in containers of 1 ounce; the powder in sprinkler containers of 2 ounces (May & Baker Ltd., Dagenham, Essex.)

TOPOCAINE (3-(2-methyl piperidino)-propyl-para-cyclohexyloxy benzoate sulphate) is a new local anæsthetic for use in the treatment of skin abrasions, burns, severe sunburn, hæmorrhoids, pruritus ani, perineal wounds. Topocaine is stated to act on damaged or diseased skin and on the mucous membrane of the rectum, vagina, bladder and urethra, but has only a slight effect on the mucous membrane of the nose, mouth and pharynx, and little or none on the eye. It is issued as a water-miscible cream (0.5 per cent.), and as a lotion (0.5 per cent.) with calamine and zinc oxide (Eli Lilly and Company Ltd., Basingstoke, Hants.)

NEW HEARING AID

THE AMPLIVOX MODEL K30.—This new hearing aid completes the Amplivox K series and has been designed to provide a powerful miniature hearing aid for the very deaf whilst eliminating the use of cumbersome and weighty instruments. A high degree of amplification without distortion has been attained by fitting a flat response microphone used in conjunction with the type E3 miniature magnetic earphone. The chassis, fitted with plug-in valves, is contained in a die-cast aluminium alloy case, and access to the battery department is facilitated by a hinge spring cover. The H.T. battery is a 30 volt (Ever Ready B.123 or equivalent) and the L.T. battery a 1½ volt twin cell type (Ever Ready D.12 or equivalent). (Amplivox Ltd., 2 Bentinck Street, London, W.1.)

'PRELUDE TO PROGRESS'

'PRELUDE TO PROGRESS' is the title of a Festival of Britain film produced by Wallace Productions Ltd., for United Dairies Ltd., to demonstrate the progress in the dairying industry during the century since the last Festival of Britain was held in 1851. The growth of bacteriology from the early experiments of Louis Pasteur in the 1850's, and the incorporation into the dairying industry of hygienic measures founded on his findings

CONTINUED ON PAGE 522

are well depicted, as also the development of machinery in the manufacture of dairy produce and the perfection of methods of delivery. Copies of the film (35 and 16 mm.—running time 37 minutes) will be available. (United Dairies Ltd., 34 Palace Court, London, W.2.)

PUBLICATIONS

Addendum 1951 *to the British Pharmacopœia* 1948 has been prepared in accordance with the general principle of the Commission, i.e., that supplements should be issued from time to time in order to keep the Pharmacopœia in alignment with advances in therapeutics and ancillary services. New drugs which have become increasingly used since the publication of the Pharmacopœia in 1948, and are of sufficient importance in medical practice, have been included: among these are cetrimide, dimercaprol, proguanil hydrochloride, and propylthiouracil. Revision of the monographs on penicillin has been carried out and new monographs added on benzylpenicillin, procaine benzylpenicillin, streptomycin-calcium chloride, streptomycin hydrochloride, streptomycin sulphate, dihydrostreptomycin, and chloramphenicol. (Published for the General Medical Council by Constable & Co., Ltd., 10 Orange Street, London, W.C.2, price 17*s.* 6*d.*)

Current Therapy 1951, edited by Howard F. Conn, M.D. To those who have sampled previous editions, all that need be said is that the new edition maintains the high standard of its predecessors, and that forty-nine new contributors have been added. The up-to-dateness of the book is well exemplified by the fact that the thiosemicarbazones are referred to in the treatment of tuberculosis, and that there are twenty-three references to terramycin in the index. (W. B. Saunders Company, Ltd., 7 Grape Street, London, W.C.2, price 50*s.*)

Your Children's Feet. By Charles A. Pratt, M.C.S.P. The author, a physiotherapist, describes very clearly for parents the prevention, signs and treatment of foot deformities. He found these in four out of every five of several hundred Lancashire school children of thirteen to fifteen years; but, as he found an 'arch defect' in almost three-quarters, his estimate of 'normal' must be suspect. The 'expert' appears overmuch, and occasionally the 'foot specialist', or even 'foot therapist', raises his ugly head. (C. A. Watts & Co., Ltd., 5 & 6 Johnson's Court, London, E.C.4, price 7*s.* 6*d.*)

Design for Sanatoria.—The Report of the NAPT Architectural Committee (Chairman, Dr. Geoffrey Todd), although optimistically timed, is a valuable contribution to the designing and equipment of a sanatorium, which should increase the efficiency and lighten the labour of the staff. Among the subjects discussed are choice of sites for, and size of, sanatoria; lighting and heating; elimination of noise; ward services; facilities for major surgery; occupational therapy; staff accommodation; and sanatoria in tropical and semi-tropical zones. As the sanatorium is the patient's home for many months, the therapeutic value is stressed of bright colours, attractive paintwork, and pleasant carpets and chair-covers. The Report is illustrated with 26 photographs and a series of plans, and there is a full index. (N.A.P.T., Tavistock House North, London, W.C.1, price 12*s.* 6*d.*)

The Ciba Foundation.—The first report of the Foundation, which covers the first eighteen months of its existence—from the formal opening in June 1949 to the end of 1950—is a credit to the officers of the Foundation and a tribute to the foresight and initiative of the founders (Ciba Limited). During the period covered by the report some 1,800 people 'active in medical and chemical research', among them many internationally famed names, have attended conferences or lectures at the Foundation. Eight conferences have been held, six of which dealt with different aspects of steroid hormones. Relations with other societies are rapidly developing. An arrangement for accommodation of Fellows of the Royal Society of Medicine has been made, when rooms are not required for overseas visitors. During 1950, meetings of committees of the Empire Rheumatism Council have been held at the Foundation, as have the first four meetings of the recently formed Renal Association. An interesting development is that the library and museum of the Hunterian Society are now housed at the Foundation. (The Ciba Foundation, 41 Portland Place, London, W.1.)

Royal Victoria Hospital Tuberculosis Trust, Annual Report 1949-50.—This, the twenty-sixth Annual Report of the Trust, shows an increase in the total amount of financial assistance given during the year. The total mortality rate for tuberculosis during 1949 shows a decrease—at the end of 1948 the figure was 75.5 per 100,000, whereas at the end of 1949 it was only 65 per 100,000. There was also a fall in the tuberculous meningitis death rate—from 5.5 per 100,000 in 1948, to 4.5 per 100,000 during 1949. Gracemount Dairy Farm, which was instituted to demonstrate that non-tuberculous milk could be produced and marketed on a commercial basis, has fulfilled its purpose and

CONTINUED ON PAGE 524

THE CHEMOTHERAPY OF **TUBERCULOSIS WITH P.A.S.**

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has been presented to the University of Edinburgh for use as a training centre for students; it has been re-named 'The Sir Robert Philip Memorial Farm, Gracemount'. (Royal Victoria Hospital Tuberculosis Trust, 42 Castle Street, Edinburgh.)

Oxoid Culture Media.—Oxo Ltd. has issued a Culture Media handbook in loose-leaf form, which bacteriologists and laboratory technicans will find useful. As fresh information becomes available, or new preparations are introduced, additional pages will be sent out. (Oxo Ltd., Medical Department, Thames House, Queen Street Place, London, E.C.4.)

Energen Book.—The fifth edition of the *Energen Book*, first issued in 1939, contains dietaries and specimen menus for common disturbances of health, alphabetically arranged; diets for children; directions for 'sane slimming'; a section on food rationing and substitutes for non-available foods; Energen nutritional recipes; and a table giving the food value of average servings of common articles of diet. (Energen Foods Co., Ltd., Willesden, London, N.W.10)

OFFICIAL PUBLICATIONS

Special Diets for Invalids.—The Ministry of Food announces the publication of a new edition of memorandum Med. 2 (1950), which details the arrangements for granting special rations and priority allowances of food to invalids, and includes a new item, hypertension (Kempner rice diet). Registered medical practitioners can obtain copies from their Local Food Office. Newly qualified doctors will be sent copies as their names are added to the Medical Register.

(P.N.51311a), issued by the Ministry of Health, announces that, on the recommendation of the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council, patients with nephritis accompanied by gross œdema, albuminuria or hypoproteinæmia will, until further notice, be allowed six extra meat rations weekly, instead of four. Ministry of Food pamphlets Med. 2 (1950) should be amended accordingly. No increases have been recommended for patients with diabetes mellitus, hepatitis, or steatorrhœa.

Schoolboys' Diets.—This is a report which has just been published by the Social Survey of the Central Office of Information, for the Ministry of Health. It is based upon an inquiry carried out in 1949 into the diets of 370 boys, aged six to fourteen years, drawn from families of lower paid workers, i.e., whose weekly wage rate was under £5 10*s.* per week. The diets were found to be 'broadly adequate and well varied', and 'the intakes of calories and nutrients were generally satisfactory in all'. It is interesting to note that 'the nutritional value of the poorer class children in this 1949 Main Survey compares well with that of middle-class children's diets before the war'. (The Librarian, Social Survey, Montagu Mansions (Block 1), Crawford Street, London, W.1, price 5*s.*)

Purification of Swimming Bath Water.—According to the report of an official committee, 'The Purification of the Water of Swimming Baths' published by the Ministry of Health, in properly controlled swimming baths the risk of water becoming sufficiently polluted to cause harm is remote. Adequate ventilation should minimize the risk of air-borne infection, and overcrowding of the baths should not be allowed to occur. The various sources of pollution are considered, and methods of purification are described in technical detail (H.M. Stationery Office, price 1*s.* 6*d.*)

The Ship Captain's Medical Guide.—Amendment No. 4 to *The Ship Captain's Medical Guide*, 1946, issued by the Ministry of Transport, is a 26-page, illustrated document, which deals mainly with the use of penicillin and chloramphenicol by Masters of Scale II ships. The section on venereal diseases has been revised. Amendment No. 5 to *Merchant Shipping Medical Scales*, 1945, makes compulsory the carrying of penicillin and chloramphenicol in medical cabinets of Scale I and II ships. (H.M. Stationery Office, price 1*s.* 3*d.*, and 2*d.* net, respectively.)

Diphtheria Prophylaxis: Publicity Campaign.—The Ministry of Health has issued an illustrated brochure, 'Immunisation against Diphtheria: National & Local Publicity 1951', according to which more than 9,000,000 children have been immunized in the last ten years, and the number of deaths from diphtheria has declined steadily from an annual average of 2,800 in the 1930-40 period to fewer than 100 a year. A drop of 27,000 immunizations in the first half of 1950 suggests that parents are less alive to the dangers of the disease. The continued success of the campaign is also threatened by the recognition of the very occasional association between diphtheria immunization and poliomyelitis. The brochure contains suggestions for planning a local campaign, and lists free publicity material available on request to the Central Office of Information. Some attractively printed specimens are included in the pocket of the brochure.

THE PRACTITIONER: 50 Years Ago. See page 525

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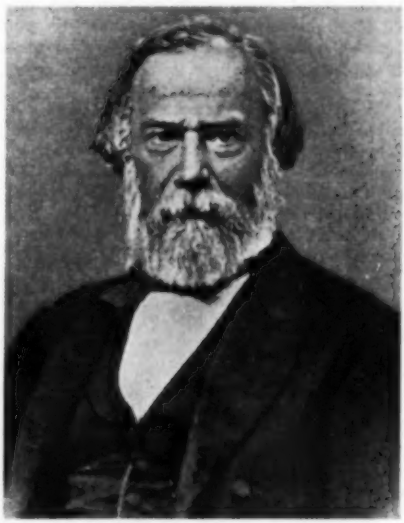
THE PRACTITIONER
Fifty Years Ago

'Commonly physicians, like beer, are best when they are old; and lawyers, like bread, when they are young and new'.—Thomas Fuller: *The Holy State and the Profane State.*

MAY, 1901

As it was impossible to publish all the original papers on organotherapy in the April 1901 number, the remainder appear in this issue. William Bulloch, Bacteriologist to the London Hospital, discussing recent work on the nature of cytotoxins and their relation to practical bacterio-therapeutics, 'throws light on an abstruse subject'. Walter E. Dixon, then Assistant to the Downing Professor of Medicine in the University of Cambridge, in an article entitled 'The Composition and Action of Orchitic Extract', recalls that this glandular extract was supposed to form the active constituent of the potions used by 'the libertine youth of Imperial Rome as a method of renewing their wasted energy', and that it has been recommended for a variety of psychoses, for epilepsy, tabes, and phthisis. 'It has, however, been suggested at one time or another for practically every form of disease'. In a second paper, 'The Ovary as an Organ of Internal Secretion', Dixon complains that 'Our knowledge of the physiological action of ovarian extract is still very meagre, but in spite of this drawback ovarian tabloids appear to be at the present time a drug *à la mode* in all cases of menstrual trouble and in chlorosis'. Charles R. Box, Assistant Physician to St. Thomas's Hospital (who died April 3, 1951, aged 85), takes as his subject 'The Therapeutic Value of Suprarenal Preparations in Addison's Disease'. Suprarenal extract, comments the Editor, 'has recently had greatness in a therapeutic sense thrust upon it, particularly in America, where it is recommended by various authorities as a specific for the most diverse ailments, from hay fever to snoring. Here again the "dry light" of science shows things in their proper perspective'. Dr. Box is most disappointed to have to state that 'an authentic cure of an undoubted case of Addison's disease does not yet appear to have been recorded. Even the evidence of any lasting improvement under suprarenal or any other treatment is at present inconclusive . . . many of the reported cases have to be rejected simply on the ground of incomplete examination. In his own hands suprarenal therapy proved a failure, possibly because 'the active substance has not been properly administered', or because 'the requisite material is not present in the suprarenal bodies as at present prepared for administration', or because 'the lack of a certain internal secretion is not the sole or predominant factor in Addison's disease'. It is interesting to recall that Jokichi Takamine in Detroit that very year isolated 'the blood-pressure-raising principle of the suprarenal glands'. A further twenty-eight years had to elapse before J. M. Rogoff and G. N. Stewart



Charles Edouard Brown-Séquard
(1817-1894)

first used suprarenal cortical extract in the treatment of suprarenal insufficiency. In his review, 'The Therapeutic Value of Extracts of Certain Organs, Collected from Recent Work by French Authors', Leonard Robinson, Physician to the Hertford British Hospital, Paris, summarizes the results obtained from experiments on animals and the clinical application of extracts of liver, pancreas, stomach, and intestine.

The Hero of Medicine this month is Charles

FIFTY YEARS AGO—*continued*

Edouard Brown-Séquard (1817-94), who, 'if not the "onlie true begetter", may justly be called the restorer, of organo-therapy . . . Brown-Séquard was a scientific Ulysses, who saw the manners and cities of many men. He crossed the Atlantic more than sixty times . . . Like John Hunter, he valued money only as a means of work, and he worked every day without interruption, beginning at the same early hour and continuing for the same number of hours whether at home or in the railway, or on sea. He made an extraordinary accumulation of notes . . . all this multifarious material being methodically stowed away in envelopes, endorsed, classified, and always kept in hand. His notes were mostly written on the edges of newspapers and on little pieces of paper torn off letters which he received'.

The symposium concludes with a medico-literary causerie on 'Organo-therapy in the Middle Ages', from which we learn that the elder Mesue, physician in ordinary to the Caliph Haroun the First, looked upon the brains of sparrows as 'the most admirable and most efficacious excitants to venery'.

In his review of dermatology, the late Sir James Galloway, in those days Physician to the Skin Department at Charing Cross Hospital, reminds us that fifty years ago thyroid was used for the treatment of cutaneous tuberculosis, with apparently satisfactory results: 'The form of tuberculosis which appeared to benefit most from the drug was the type showing superficial ulceration, hyperkeratosis, and the formation of more than usually badly developed scar-tissue'. 'The commencement of the new year (begins the author of the section 'Notes on Books') brings with it always the usual crop of annuals, more or less hardy and useful'. Brief reference is made to 'Wright's well-known "Medical Annual", which has now completed nineteen years of existence', and to Gould's 'Year-book of Medicine and Surgery'.

'The completeness of this work seems at first sight almost incompatible with its comparatively small size', writes Sir Humphry Rolleston of 'Cancer of the Stomach: A Clinical Study', by Osler and McCrae. 'The truth is that, without suffering from brevity, there is not a word too much; every point is clear and supported by statistics and observation, while vague statements, general impressions, and padding are conspicuously absent'. 'Constipation and Some Associated Disorders' by Edward Blake is 'especially addressed to mature men of ripe judgment who are too busy to gather fruit for themselves', and the author has for this purpose 'culled the products of many climes'.

Under the heading 'The Futility of Gargling', 'Practical Notes' quote from an article in the *New York Medical Journal* by Sanger, who brushed his tonsils with methylene blue and found that water, thoroughly gargled, returned uncoloured from the mouth. After dusting the throat with flour and using a gargle containing iodine, the blue colour appeared only on the velum palati and on the tongue. W.R.B.

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